

Author: Pennsylvania Dept. of Forestry

Title: Bulletin, no. 14 - no. 16

Place of Publication: Harrisburg, Pa.

Copyright Date: 1916 - 1917

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A GUIDE TO THE EXHIBIT

OF THE

PENNSYLVANIA

DEPARTMENT OF FORESTRY

AND

INFORMATION ABOUT THE WORK OF THE
DEPARTMENT

ISSUED BY DIRECTION OF THE COMMISSIONER OF FORESTRY
BULLETIN 14. SEPTEMBER, 1916

HARRISBURG, PA.:
WM. STANLEY RAY, STATE PRINTER.
1916

THE HISTORY OF THE

REIGN OF

CHARLES THE FIRST



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EXHIBIT OF THE PENNSYLVANIA DEPARTMENT OF FORESTRY.

Below is given a guide to the exhibit of the Department, and a short description of articles on exhibition.

Men of the Pennsylvania Forest Service will be in constant charge, and are here to answer questions about the exhibit or the work of the Department.

A. WOOD SPECIMENS.

The wood specimens mounted in the green cases are taken from trees which are native to Pennsylvania. Most of them were taken from trees cut on the Pennsylvania State Forests. The wood has not been finished or treated in any way except that it has been roughly polished with sand paper.

The printed cards in the boxes give the common and botanical names of the trees from which the specimens were taken. The two names are given because many trees have more than one common name, and the scientific name makes it simpler to identify them.

The circular specimens are cross sections, cut at right angles to the stem of the tree. Wood used for paving blocks is often cut in this way. The rings, which are very noticeable in most of the specimens, are caused by the difference in density between the wood grown in the spring, and that grown in the summer. Each ring marks a year's growth, and the age of the tree at the point where the specimen was taken out is the same as the number of rings on the specimen.

The two board-like specimens displayed with the cross sections are tangential and radial sections. The radial section is made by cutting from the circumference to the center of the tree. Quartered oak is the best example of radial cutting. The tangential sections are made by cutting at right angles to a line passing from center to circumference of the tree. The greater part of the lumber in common use is cut in tangential section.

B. PHOTOGRAPH CASES.

The pictures in the large photograph cases were almost all taken on or near Pennsylvania State Forests. The cases are numbered from 1 to 5, and, so far as possible, the photographs are arranged in series. Starting at case 1, and following through the series to case 5, you will follow roughly the history of Pennsylvania's forests.

First come the virgin stands of huge pines, hemlock and hardwoods, the forests which made Pennsylvania at one time the first timber pro-

ducing State of the Union, and which led careless people to think that our timber supply was inexhaustible. Notice especially the heavy canopy, and the thick carpet of leaves on the forest floor. These are Nature's provisions for keeping a check on the rise and fall of our streams. The litter on the ground acts both as a reservoir and a filter, and, except for direct precipitation, is the largest single factor influencing floods and water famines.

The lumberman was the chief actor in the second chapter of the story of the forest. Many call him the chief villain, but mistakenly. Pennsylvania's magnificent timber was needed to build houses and barns, ships and railroads, and it was one of the principal reasons for the rapid development of our State after the colonial days. The only just charge that can be placed at the door of the lumberman is that he was wasteful of a commodity which seemed to be unlimited in quantity and unsurpassed in quality. Lumbering machinery was not perfected, prices were low, and the distance to market was great. So it is not surprising that only the best part of the tree was used, and the remainder,—frequently the larger part of the tree,—was left to rot in the woods.

Usually this tangled debris did not have time to rot. Some thoughtless person dropped a lighted match, or some careless camper forgot his fire, and in the dry springs and autumns conflagrations started which often burned over whole townships. These fires destroyed not only the litter which the lumberman left to rot, but the green trees which were too small to cut, and which were the only hope for a natural reproduction of the forest. They burned the leaves and humus on the ground, so that the water no longer seeped into the streams gradually, but ran off the hills in torrents. It is safe to say that more game has been destroyed and driven away by forest fires than has ever been seen by hunters.

After the forest fire had followed the lumberman, the transformation of the primitive forest to a barren waste was complete. Weeds, ferns, bracken, scrub oak, and worthless tree species took the place of the pines and hemlock of other years. Pennsylvania dropped from the first timber producing State of the Union to the twentieth. Floods came in the wet seasons. Water was scarce in periods of slight rainfall. Our streams were no longer constant in flow, but subject to ups and downs with every change of weather.

Thoughtful people realized that something must be done. Private owners of forest land could not, for financial reasons, care for their land according to the conservative forestry methods practiced abroad. Low prices and high taxes put private forestry out of the question. The only solution was State ownership and State forestry. A conservation campaign was waged for over fifteen years before the people

were awakened to the necessity for action. The Department of Forestry was finally created, with Dr. J. T. Rothrock as the first Commissioner, for the purpose of purchasing forest land for the State, subduing forest fires, and finally restocking the barren land with trees so that it might some day be brought back to its former condition. This is the concluding chapter in the story of the forest, but some day we should be able to write an epilogue which shall tell of the reconstruction of the forests which have been so largely responsible for our very existence as a great Commonwealth.

C. SEED JARS.

In the glass jars scattered among the other exhibits are shown seeds of some of Pennsylvania's native forest trees. The labeling is the same as in the wood specimen cases, both common and scientific names being given. These seeds were all collected in Pennsylvania. From seeds like these the Department of Forestry is raising and planting 6,000,000 trees a year.

This year experiments are being started with the Russian mulberry, and other fruit-bearing trees, with the idea of producing trees which will be of value for their timber, and at the same time help feed the birds. Among the trees which produce bird food in abundance are the paw paw, mountain ash, sassafras, black cherry, Spanish yellow cherry, June-berry, dogwood, and hackberry. The wild grape vine and the mountain ash both hold their fruit so that birds can feed on it during the winter months.

D. LEAF MOUNTS.

These are the green leaves under glass suspended on the walls of the booth. They are not mounted leaves, but wax models of leaves. They have the exact size, shape, and veining of the original leaves.

A good dendrologist should be able to identify most of Pennsylvania's trees by their leaves alone. Each leaf has characteristics of its own. Note especially the difference between the white oak and red oak leaves.

E. FOREST TOOLS.

1. Double bitted axe.
2. Mattock, used for planting trees.
3. Mallet, used to firm ground around planted trees.
4. Fire torch, used for backfiring. Burns kerosene or lard oil.
5. Sprouting axe, used for removing sprouts from stumps which it is desired to kill.
6. Fire rake, used in making path for backfiring.
7. Calipers, used for measuring diameter of trees.
8. Small hand axe.

F. ILLUMINATED LANTERN SLIDES.

These are arranged in the same way as the photograph cases, starting with the slides showing virgin forests, and ending with the slides showing the work being carried on by the Department. The title of each slide is given in the brass clip below it.

G. MAPS AND CHARTS.

1. Large map of Pennsylvania, showing State Forests, forest nurseries, district foresters' locations, etc.
2. A topographic map of a State Forest, showing roads, trails, fire lanes, boundary lines, streams, etc. This is the detail map from which the forester makes his working plans.
3. A warrantee map of a part of a State Forest, showing boundary lines, survey marks, area, date of acquisition, and original survey. These maps are made by the Division of Surveys of the Department of Forestry for the guidance of foresters in establishing on the ground the boundary lines of their forests.
4. A map showing the present status of the chestnut blight in Pennsylvania, so far as it could be determined from the reports made by foresters. The solid black circles show places where the blight is spreading; the half black circles show where it is stationary; the open circles show where it is not present, or no report was made. Contrary to general public opinion, the blight is advancing rapidly almost all over the State.
5. Maps of Pennsylvania showing graphically.
 - a. The total area of the State.
 - b. The area of forest land in the State.
 - c. The area of State Forests.
 - d. The area which should be State Forest.
 - e. The area burned over each year.
 - f. The total area kept unproductive by forest fires.

The areas are drawn in to scale. Notice the relation of the present area of State Forests to the area which should be State Forests.

6. A sketch showing the relation of the damage done by forest fires to the amount appropriated for extinction and prevention of fires.
7. Map of a State Forest of special interest to sportsmen. This map shows roads, fire lanes, trails, Forest headquarters, streams, camp sites, etc. It is issued by the Department, and sold to hunters at a nominal price. These maps are not yet available for all the Forests, but will be made up and placed on sale as rapidly as possible.

H. SEEDLINGS.

The small trees in the brown paper pots will be given away free to those who ask for them, provided they promise to plant and care for them. The ones with the stiff, light green needles are Norway spruces. The ones with the gray-green, flexible needles are white pines.

These trees are two years old. They are raised from seed by the Department of Forestry in the State Forest nurseries. 13,000,000 are now in stock in the 26 nurseries. When they reach this size they are planted on the State Forests at the rate of about 6,000,000 a year, for the purpose of reforesting our barren and burned over mountains. (See articles elsewhere in this pamphlet for directions for planting the tree you receive here, and for conditions under which you may secure larger quantities for forest planting).

DIRECTIONS FOR PLANTING THE SMALL TREES WHICH ARE DISTRIBUTED AT THIS EXHIBIT.

1. Your care of the tree should start when you receive it. Don't batter and bruise it on your way home, and still expect it to grow. Trees appreciate kindness just as much as animals.
2. These trees are potted in very shallow pots. As soon as you take them home you should transplant them to the place where you want them to grow finally.
3. This place should be in good soil, but unless the soil is unusually poor, you need not give the tree any fertilizer.
4. Dig the hole for the tree deep enough so that the roots will not need to be bent in planting.
5. When the hole is ready for the tree, don't jerk the tree out of the pot in which you receive it. One pull will tear off many little rootlets on which the tree depends for its life. Cut the pot away with a knife or scissors, and take out the tree with the ball of ground still attached.
6. Gently loosen and remove the ball of earth in which the tree is now planted. Straighten out the roots carefully, and set it in the hole you have dug. Be careful not to set the tree deeper than it was before. A little collar around the stem will show you how deep it stood in the ground in the nursery. Set it to the same depth.
7. Now pack the earth tightly around the tree. Use only soil for packing. Don't put in grass or other material which will decay and leave an open place. And pack the soil tightly.

8. The tree will not freeze. You may leave it outdoors all winter. The only time cold will hurt it is in the spring, when a late frost may nip the new growth.
9. These trees are conifers, and will not stand extreme shading. Keep down the grass, weeds, or other growth which may over-top them and shade them out.
10. Remember that you received the tree from the Pennsylvania Department of Forestry, and that the Department wants your help in conserving and replacing our forests for the use of Pennsylvania's people in the time to come.

THE CAMP AND THE CAMP FIRE.

With the increase in the number of those who camp on the State Forests, the proper care of camp fires is becoming of more and more importance in forest protection. In 1915 one hundred and thirty-six forest fires were directly traceable to the carelessness of hunters and campers, and the resulting damage was over \$100,000. If these men had taken proper care of their camp fires, this damage would have been lessened and probably eliminated, and the campers would have had their reward in being more comfortable, and in being able to return to a camp site not rendered unrecognizable by fire.

To the seasoned camper, this article will be merely the rehashing of the A. B. C.'s of woodcraft, but it will be strictly news to many of the more recent additions to the outdoor army.

Where to Camp.

In choosing a camp site, there are only two prime requisites for the experienced woodsman,—wood and water. Given a good supply of these, your old hunter will undertake to pass a restful night almost anywhere. Look to these things first when you are in a strange woods. If you cannot get both together, choose water first in summer, and wood in fall and winter.

Three other points should be given due consideration:

- (1) A site on a hilltop is exposed to the wind.
- (2) Frost settles first and heaviest into the stream bottoms.
- (3) As a rule, the best springs and fire wood are not found in the main creek bottoms, or "draws," as they are colloquially called, but in the smaller hollows which branch off from these main hollows. Hence the best camp site is usually neither on a hill nor along a creek, but between the two.

The Camp Fire.

Supposing that you have found a camp site which has the natural advantages in a combination to your liking, your first care is to start your fire and pitch your shelter,—the fire first, because it can be burning down to a bed of coals while you are driving tent pegs.

Mark it down as an established fact that no good woodsman builds a fire anywhere without taking precautions against its spreading. Get a forked stick, and scrape away all the leaves and other inflammable material for a distance of ten feet all around the place where the fire is to be, *and do this before you build the fire.*

Of course, you need some sort of a fire place. If you have a tool for digging, make a long, narrow trench in the ground, and bank up around the edges the earth you remove. Cover over a foot at the rear, and leave a small opening for a chimney, so that the smoke may be at least partly carried away. Keep your eye on the wind, and build the fire so that the smoke will be carried away from camp. If you have nothing with which to make a trench, build up a fire place with flat stones. If you can find no suitable stones, build your fire in the center of the piece of ground you have cleared of rubbish. Cut two stout forked sticks, and drive them, forks up, one on each side of the fire. Get another strong stick, and lay it across the forks. Now cut several smaller forks, the weaker side of the fork three or four inches long, and the stronger side from one to two feet long. Drive nails every two or three inches in the stronger fork, at a sharp upward angle, and hang the forks on the cross-stick by these nails. Hang your pot on the weak fork, and regulate the distance above the fire by hanging the fork by a higher or lower nail. If you have no nails, drive the heavy forked sticks a little deeper, and hang your kettle directly on the cross-stick.

For the actual building of the fire, you should have (1) a small amount of quick burning, easily ignited wood for kindling; (2) a larger amount of wood which will burn quickly to coals for cooking; and (3) a still larger amount of slow burning wood for heating. Following is a list of woods classified under these headings in the order of their excellence:

Kindling:

- Pitch pine knots, split.
- White pine.
- Thoroughly dry *inside* chestnut bark.
- Birch bark.

Cooking wood:

- Bark of dead hemlock, pine, hickory, or maple.
- Dry aspen.

Hickory.
 Black birch.
 Hardwood branches, not too large.

Heating wood:
 Hickory.
 White oak.
 Hard maple.
 Beech.

The last named woods, although they make excellent heating fires, should be watched after the fire is well started. They are "spitters," or "snappers," that is, they discharge glowing coals to a considerable distance, and if not watched may start a forest fire which will cover a township. Scrape the dead leaves and litter away for at least ten feet, and keep a watch in addition. Most of the light tents burn easily, and a glowing coal may destroy your shelter at a most inopportune time.

Breaking Camp.

Most camps are broken in the morning because distance to the settlement or railroad makes it advisable to take a whole day for moving. Transients almost invariably break camp in the morning.

Remember this:—The morning is a period of comparative calm and dampness. In these still hours your camp fire may seem dead and cold. Don't trust it! A wind, springing up later in the day, may fan hidden coals into a blaze and start a forest fire which will transform your camp site from a natural beauty spot to a charred and desolate reminder of your own carelessness.

As soon as breakfast is over, spread the coals out flat, and pour water over them. Don't be niggardly. Use all the water you think is needed, and then carry an extra bucketful. Now break camp, keeping an eye on the fire for signs of life. When your packing is done, turn over the coals, and put the extra bucketful of water on the fire, whether you think it is needed or not.

Finally, be moderate. Don't build a bonfire. What you want is a companionable blaze to sit or lie beside, not a huge conflagration which must be regarded with awe and approached with respect. Besides, you may want to come back to the same site next season, and you'll wish then that you had left some dry wood within a mile.

HOW SEEDLING TREES ARE DISTRIBUTED FREE OF CHARGE BY THE DEPARTMENT OF FORESTRY.

Below is given a copy of the act, passed at the last session of the Legislature, which authorizes this Department to distribute seedling trees from its nurseries.

AN ACT

Authorizing the Department of Forestry to grow and distribute young forest trees, and restricting their use after distribution.

Section 1. Be it enacted, etc., That the Department of Forestry is hereby authorized to grow young forest trees, and to distribute them to those desiring to plant them, in such quantity and under such regulations as may be prescribed by the department, when the available stock in the forest nurseries shall be in excess of that required by the department for forest planting. No charge shall be made for the trees so distributed, but the cost of boxing and shipping shall be paid by the applicant. The applicant must enter into an agreement with the department to plant the young trees under such conditions or regulations as may be made by the department, and to protect and care for them when planted. The department may render such assistance and instruction in the planting of trees as it may deem necessary to secure their proper planting.

Section 2. That all such young forest trees, which shall be distributed as aforesaid, shall not be subject to sale in the hands of the applicant, but shall be properly planted in accordance with the agreement entered into with the department.

Under the provisions of this act the Department distributed over a million trees in the spring of 1916. By a ruling of the Commission, trees were not distributed in lots of less than 500, and no trees were furnished except for strictly forest planting. Shade and ornamental trees cannot be supplied from the State Forest nurseries for the reason that trees are taken from the nurseries when only two years old (see trees at this exhibit), and are then altogether too small for anything but forest planting.

The trees were shipped by parcel post or express, and, where the number was not too great, were packed in pasteboard boxes. The charges for lifting, bunching, and packing averaged about ten cents per thousand. The charges for shipping varied from ten to twenty cents per thousand, depending on the species shipped and method of shipping.

It is impossible to tell how many trees will be available for free distribution in the spring of 1917. The number will be influenced

by weather conditions, insect and fungus attacks, and funds available for planting on the State Forests,—all factors beyond the control of the Department.

PLANTING OF TREES TO FURNISH FOOD FOR BIRDS.

Under the heading "C," on page 5, will be found a partial list of the trees which are best adapted to furnish food for birds. For a number of years the Department of Forestry has been planting black cherry trees on the State Forests. This spring (1916) between 5,000 and 6,000 black cherry trees were distributed as widely as possible over the State, to be planted in places where food was needed for the birds. 3,000 of the trees were distributed in 200 lots to fifteen game wardens, and were planted by them in places where they could be cared for, and the birds allowed to feed on their fruit in safety.

Several hundred cuttings were made from a sweet mulberry growing on the property of Hon. I. C. Williams, Deputy Commissioner of Forestry. These cuttings have been distributed among the nurserymen of the Department, and will be set in the forest nurseries and allowed to multiply, so that in a few years a number will be available for distribution every year.

STATE FOREST PLANTING
SUMMARY BY YEARS
Number of seedlings planted, and area.

Year.	Number of Plantings Made.		Number of Seedlings Planted.		Area Treated. (Acres.)	
	New plantations.	Reenforcements.	In new plantations.	For reenforcements.	New plantations.	Reenforcements.
1899,	1	.....	1,000	.....	.....	.....
1900,	1	.....	1,500	.....	.....	.....
1902,	1	.....	5,000	.....	2.5	.....
1903, .....	.....	1	.....	1,600	.....	2.5
1904,	2	.....	7,700	.....	4.5	.....
1905,	2	.....	40,000	.....	24.3	.....
1906,	10	.....	99,560	.....	37.5	.....
1907,	8	1	35,980	2,000	17.1	4.5
1908,	21	.....	100,623	.....	48.4	.....
1909,	66	3	733,418	5,043	279.3	4.5
1910,	90	6	971,840	120,373	423.8	73.4
1911,	111	9	1,547,505	116,156	713.5	85.2
1912,	132	19	1,745,722	144,682	857.5	174.4
1913,	118	20	3,101,107	63,530	1,597.6	84.1
1914,	126	25	3,239,256	154,315	2,209.6	182.9
1915,	126	29	4,195,086	120,350	2,718.3	163.6
Totals,	815	113	15,825,242	728,049	8,938.7	775.1

See statement elsewhere in this pamphlet for approximate number of trees planted in 1916, and area covered.

WHAT THE DEPARTMENT OF FORESTRY HAS ACCOMPLISHED.

(This summary is complete to January 1, 1916.)

Total area of State Forests (Acres),	1,012,098
Total cost of State Forests,	\$2,309,943
Average cost per acre,	\$2.28
*Present value of State Forests,	\$6,000,000
†Foresters trained at the State Forest Academy,	78
‡Foresters now in Pennsylvania Forest Service,	62
Rangers now in Pennsylvania Forest Service,	82
Trees planted to date on State Forests, about,	23,000,000
Area planted to date on State Forests, (Acres),	12,000
Trees planted on State Forests spring 1916,	5,500,000
‡Trees distributed to private individuals,	1,500,000
Total number forest nurseries established,	26
Trees now in stock in State Forest nurseries,	13,000,000
Nurseries with annual capacity of 1,000,000 or over, ...	4
Miles old road opened by the Department,	1,265
Miles new road built by the Department,	316
Miles trail built by the Department,	529
Miles boundary line opened by the Department,	1,057
||Miles fire lane opened by the Department,	727
Total length roads, trails, fire lanes, and boundary lines,	3,894
Boundary line surveyed but not opened,	1,637
§Telephone line built (miles),	254
Forest telephones connected,	86
¶Fire towers erected,	101
Springs cleaned and walled,	1,168
Fish planted by State foresters,	1,000,000
Camp sites leased,	300
Income from State Forests,	\$125,000

WHY IS THE DEPARTMENT OF FORESTRY?

(1) The natural resources of any Commonwealth must be managed for the good of that Commonwealth as a whole, and not for the benefit or enrichment of any particular person, clique, or corporation.

*This is a very conservative estimate of the actual present sale value of the State Forests.

†Correct to July 1st, 1916.

‡An act of the last Legislature authorizes the free distribution of trees under certain conditions. See article elsewhere in this pamphlet.

§These lanes are kept free of all inflammable material, and are from 4 to 60 feet wide.

¶221 miles of this line is metallic circuit, and 33 miles ground circuit. The average cost of construction is only \$52.12 per mile. Instead of 200 miles, the Department should have 2,000 miles of telephone line.

||27 of these towers are built of wood, 7 are of steel, and the remainder are built in trees. The towers are so located that large areas of forest land may be viewed from them, and men are in constant duty on the towers during fire season.

(2) Our forests exercise a direct influence on every part of the State, and on the lives of its citizens; therefore they are one of the most important of our natural resources, and must be managed for the best good of the whole people.

(3) Our cut over forest lands are not so managed, and cannot be so managed by private owners.

(4) Therefore the only solution is State ownership and State management of forest lands which, under private ownership, would become barren and permanently unproductive, and a menace instead of a benefit to the public.

If you admit the truth of the first of these statements, you cannot deny the truth of the other three, for they are the logical outgrowths of the first. Our forests are a common inheritance, and should be passed on undamaged as a common bequest to succeeding generations.

Forestry means the management of forest lands in such a way that they shall be kept productive for all time. The forester proposes to raise successive tree crops in the forest just as the farmer raises successive grain crops on his farm, and he proposes to do it in a way that the mature crop shall not only pay for the cost of the operation, but return a profit at the same time.

Forestry is not a get-rich-quick scheme. It requires a considerable outlay of capital at the start, and it means a long term investment. Returns of any consequence cannot be expected from forestry in much less than fifty years. Hence forestry is not attractive to private capital, and our lumbermen, when they had cut over a tract of virgin timber, moved on to another tract, and left the cut over tract to care for itself. Forest fires followed, and destroyed what few trees were left by the cutters. After some years of this procedure, it became apparent that if this cut over land was to be prevented from becoming permanently worthless, it must be acquired by the State, what trees there were on it must be protected, and trees must be planted where there were none.

These are the reasons, in brief, for the existence of the Department of Forestry. Its chief purpose is to restore Pennsylvania's forests, and to maintain them perpetually for the benefit of the whole people. It was not created to furnish desk jobs for soft snap hunters, and the men of the Pennsylvania Forest Service are not political appointees. They are enthusiastic in their work because they believe in it. They do not prescribe forestry as a remedy for every human ill, but they do say this:—Look at your tax rate closely; see how it mounts from year to year; observe the direct relation it has to the cost of living. What will it be when your grandchildren have taken your place? When a tax is put on coal, who pays it? When a stamp tax

is decreed, who buys the stamps? When five million acres of land in your State are so devastated that they are scarcely worth assessing, whose land makes up the deficit in taxes?

Suppose that the State owned these five million acres of land,—as it should,—and made them produce timber; and suppose that fifty years from now it received a net revenue of only a dollar an acre a year from the land,* would this not be lessening the burden imposed by the cost of government?

HOW YOU MAY SECURE A LEASE FOR A PERMANENT CAMP SITE.

AN ACT

Authorizing the Department of Forestry to lease portions of the State Forests for church, school, health, and recreation purposes.

Section 1. Be it enacted, etc., That the Department of Forestry is hereby authorized to lease, for a period not exceeding ten years, on such terms and conditions as it may consider reasonable, to any citizen, church, organization, or school board of Pennsylvania, such portion of the State Forest as the Department may deem suitable, as a site for a temporary building to be used by such citizen or family for health and recreation, or as a site for church or school purposes.

Under the provisions of this act the Department has already leased 300 camp sites. In accordance with a ruling of the Commission, the sites leased may be not over two acres in area, shall not be used for conducting any business, and shall be kept in good condition by the lessee. The rental charged is nominal, and averages about \$5 a year. Buildings may be erected on the sites, in which case the forest officers shall have the privilege of using them when necessity arises.

All the State Forest camp sites are numbered. If you want to lease a site, write to the forester in charge of the Forest on which the site is located for the number of the site, and then write to the Commissioner of Forestry, at Harrisburg, saying that you want to lease camp site number so and so. The forester will be asked to report on the site, and on your reputation and past conduct on the Forest. If there are no obstacles in the way, you will be informed that your application has been granted, and on the payment of the first year's rental you will be given a lease good for ten years.

*Forest land in Germany, which has been under scientific forest management for almost three centuries, gave an average *net* return of \$2.70 an acre in 1890. The net revenues from the different German state forests were from \$0.96 to \$4.40 per acre per year.

APPROPRIATIONS FOR THE DEPARTMENT OF FORESTRY
AND WHAT THEY ARE SUPPOSED TO ACCOMPLISH.
1915—1917.

For labor on the State Forests there was appropriated the sum of \$85,000, or \$42,500 per year. With a million acres of land to care for, this means that \$0.00425 may be spent each year on an acre! No figures are available to show how many years it would take to bring an acre of forest land to the top notch of productivity with an expenditure of four-tenths of a cent a year.

For foresters' and rangers' salaries and expenses there was appropriated the sum of \$225,000, or \$112,500 per year. With 1,012,000 acres of land in the State Forests, allotting 15,000 acres to each forester, and 5,000 acres to each forest ranger, the Department should have a force of about 70 foresters and 200 rangers. Counting the average forester's salary as \$100 per month, and the average ranger's salary as \$50 per month, we have an annual expenditure of \$84,000 for foresters' salaries and \$120,000 for rangers' salaries, or a total of \$204,000 a year,—all to be paid from an appropriation of \$112,500.

For the purchase of new land there was appropriated the sum of \$40,000, or \$20,000 a year. This means that at the price now being paid for land about 8,000 acres a year can be bought. To acquire another million acres of land at this rate would take just a century and a quarter.

For the expenses of the members of the State Forest Reservation Commission there was appropriated the sum of \$5,000, or \$2,500 per year. This appropriation is supposed to cover all expenses of the members of the Commission. They receive no salaries. They are supposed to examine all forest land purchased, all land offered as auxiliary forest reserves, to make inspections of the State Forests, and to attend to other matters in line with their duties which take them from end to end of the State. \$2,500 a year means \$500 for each of the five members of the Commission. At the rate of ten cents a mile, to include all charges and hotel bills, this means that each member may travel 5,000 miles a year, or a little over 400 miles a month—barely enough to take him to and from the monthly meeting of the Commission at Harrisburg.

For the purpose of preventing and extinguishing forest fires there was appropriated the sum of \$45,000, or \$22,500 per year. This amount is not for the State Forests only, but for the whole eight million acres of forest land in Pennsylvania. And it is for prevention and extinction both. It figures out to less than three-tenths of a cent per acre.

WHO'S GUILTY?

EXTRACTS FROM THE REPORT OF THE CHIEF FOREST
FIRE WARDEN.

There is no longer any question as to the value of forests and the necessity for their protection and economic management. The benefits of well-cared-for forests are well recognized, and yet the everyday attitude toward forests does not correspond with what is generally believed to be the attitude which every citizen should have, whether a timber owner or not. In caring for forests, as in the management of any other property, the foundation principle at stake is protection, and undoubtedly the one factor against which we have to work most is the forest fire. A timberland owner may practice the most reasonable methods of forestry, including natural and artificial regeneration, all classes of improvement cuttings, a careful harvesting of the crop, and yet if the property is subject to damage from fire and protection therefrom not provided, all of the other things are practically lost. Any man who would conduct a business in such a way as not to provide reasonable protection for his investment and carry insurance, would be called an unsafe business man, and, in fact, few people would hesitate to call him a fool.

Even antedating the beginning of our Commonwealth, there were laws against the setting of forest fires, but practically no attention was paid to them until it was not uncommon to find people who thought that forest fires were a part of the natural order of things, and in many cases that belief still remains. In more recent days, since the development of the forestry idea in Pennsylvania, efforts have been made to solve the forest fire problem, but it is not solved yet. The greatest difficulty in the way is the ignorance and indifference of the people. If they could only realize that every year we are permitting the burning up of millions of dollars worth of property, and bringing upon ourselves untold miseries as an indirect result of these fires, it is believed that some change in the general attitude would result. If, in any one of our towns or cities, there were a fire which would destroy, in a short period of time, a million dollars worth of property, there would not be a newspaper in the country which would not deplore the tremendous loss. The chances are that an investigation would be made into the management of the fire department, and everybody would be aroused to the necessity of preventing a recurrence of such a tremendous loss. Again, if all the indirect losses which come from forest fires, namely, loss of life; of property other than timber; inconveniences because of lack of water and the consequent sickness and death; loss of wages and taxes; depriving the citizens of game and fish; placing a community in the midst of desolation, and so forth: if these losses could be put

before the people definitely in dollars and cents, the whole State would open up its sympathetic heart and try to alleviate the loss. Probably some effort would be made to prevent a similar catastrophe happening again in that particular community, *but it is a large question as to whether or not any general preventive measures would be taken to forestall the occurrence of a similar calamity in any of the other communities of the State.*

Because of forest fires there are at least 5,000,000 acres in Pennsylvania which are kept in a non-productive state, and this vast area is constantly increasing. Some of this land is now in such condition that it will never be able to produce anything in the way of tree growth. Much of it, however, is still in such shape that tree growth could be restored, but with repeated fires and with continued erosion, the absolutely and permanently barren land is also on the increase. At a minimum figure, the citizens of this Commonwealth are losing \$20,000,000 a year because of the non-production of timber which might be growing upon these areas. What is lost from the indirect effects of such an area of desolation, in the way of floods, destruction of agricultural lands, ill health, loss of life, and loss to industries other than lumbering, no one can figure out. Truly, we are an extravagant people, burning up millions of dollars, and sitting supinely by and watching the smoke!

There are approximately 8,000,000 acres of forest land in Pennsylvania. All of it is exposed to the curse of fire. An average of 500,000 acres burns over each year. Most of it is burned over once every ten years. No system of forest management can flourish under such conditions. The direct loss from these fires is close to \$1,000,000 a year, and the indirect loss is incalculable. No people can forever suffer such a useless loss, nor is it sensible to expect them to. The mere fact that they do not realize the loss is no excuse for the State's permitting the condition to exist.

But as a safety measure the Legislature has permitted the expenditure of \$2,300,000 to purchase 1,000,000 acres of land, and an additional inadequate sum of \$1,250,000 for the development of that land, most of which will require an expenditure of \$25 per acre to put it in productive shape. It limits the purchase price per acre to \$10, and expects the Department of Forestry to protect and develop its own forests with an additional \$1.25 per acre to date. Even if adequately supported, the State's 1,000,000 acres in good condition would not offset the harm of the other 7,000,000 in desolate condition. It authorizes the planting of seedlings, but fails to prevent the burning up of millions of little trees for every thousand planted. It inadequately provides for what the State itself already owns; it is satisfied to appropriate \$250,000 toward an experiment to eliminate the chestnut

blight, but sees fit to appropriate only \$45,000 for two years to protect the total forest area of 8,000,000 acres in accordance with a plan which is not an experiment, but which has proved its efficiency in other States, and upon our own State Forests. Surely it is cheaper at \$100,000 or even \$200,000 per year, to protect all the forests from fire than it is to appropriate \$45,000 for two years, and permit the people of the State to lose from \$20,000,000 to \$50,000,000 each year.

Since June 1, 1909, the appropriations for forest fires have been as follows:

Period Covered.	Amt. Asked.	Amt. Granted.
June 1, '09—June 1, '11,	\$80,000	\$50,000
June 1, '11—June 1, '13,	60,000	50,000
June 1, '13—June 1, '15,	50,000	50,000
June 1, '15—June 1, '17,	150,000	45,000

This shows a total appropriation used for forest fires from June 1, 1909, to June 1, 1915, amounting to \$150,000, which amount was increased by deficiency appropriation to a grand total of \$177,162.37, or an average of \$29,527 per year. The average for the two years June 1, 1909, to June 1, 1911, was \$40,397.82, which is almost as much as has been aside for the reorganization of an efficient system of fire wardens and for fire prevention and extinction during two years. Surely the organization must be at the highest pitch of efficiency at once—which is impossible—or the forest fire seasons during the next two years must be extremely unfavorable for conflagrations, which is not probable, or the Legislature must be asked for a large deficiency which is certain, and which is poor business.

It should be noted that four deficiency appropriation bills, carrying amounts aggregating \$48,000 or almost a fourth of the total appropriations, were passed between 1909 and 1915.

The original appropriations, as well as these for deficiency, were used only for paying bills for the *extinction* of forest fires. The amount spent for work which could be called prevention was inconsiderable. This makes more apparent the folly of allowing \$22,500 a year for extinction and prevention combined, when past experience shows that this sum is insufficient for extinction alone.

Both Massachusetts and New York appropriate a cent per acre per year for fire protection. The average acreage per fire in Massachusetts in 1914 (the latest figures) was 12½ acres. In New York the average acreage per fire in 1914 was 33¼ acres, while in Pennsylvania in 1913 it was 508; in 1914, 305; and in 1915, 300. Pennsylvania appropriated three-tenths of a cent per acre. This is a tremendous indictment against the people and the fire protective system which they have provided. An effective organization is possible, and Pennsylvania ought to have it.

STATE GAME REFUGES.

A State Game Refuge is a tract of wild land of about 3,000 acres, controlled by the State Game Commission, and surrounded by a cleared line and a single wire, stretched about waist high. Each refuge is placed in charge of a Game Preserve Keeper, whose duty it is to extinguish and prevent forest fires in and near the refuge, destroy vermin, feed the game, enforce the game laws, and especially, guard the refuge against poachers. No one is permitted to hunt at any time within a refuge, or even to enter its bounds during the open season for game, nor is any one allowed to carry fire arms within it, or to permit a dog to enter it.

Each State game refuge is, therefore, a haven of rest into which game of all kinds may retreat, live, and breed in safety; then to spread into the surrounding region for the benefit of sportsmen. Each State game refuge furnishes more deer, wild turkeys, ruffed grouse, and other local game, than any game farm in the United States, and at only a fraction of the cost necessary to run a game farm, where attempts are made to raise game in captivity.

The State Game Commission now has under control fourteen game refuges, located both in State Forests and on leased land. The first was established in 1905 on State land in Clinton county; the second in Clearfield county on State land; the third in Franklin county on State land; the fourth in Perry county on State land; the fifth in Westmoreland county on State land; the sixth in Centre county on State land; the seventh in Potter county on State land; the eighth in Lycoming county on State land; the ninth in Huntingdon county on State land; the tenth in Carbon county on State land; the eleventh in Lackawanna county on State land; the twelfth in Bradford county on leased land; the thirteenth in Sullivan county, on leased land; and the fourteenth in Cameron county on leased land. The last named eight refuges were created since June, 1915.

The Game Commission believes that there should be a refuge in every county which has sufficient wild land for the purpose, either State land, or suitable private land which may be leased without restrictions for a period of not less than fifteen years, and preferably for twenty-five years. In the case of leased lands, the Commission desires to secure control of 3,000 acres to be enclosed as a refuge, and an additional 3,000 acres surrounding it, which will be open to hunters during the open season for game.

The Commission is anxious to have the sportsmen help them to do the many things necessary in order that conditions may be improved. If you know of a tract of suitable land in a county in which there is now no refuge, or if you know of a violation of the game laws in any

part of the State, you will be benefitting yourself, as well as other sportsmen, by writing to the State Game Commission, at Harrisburg.

COUNTIES IN WHICH STATE FORESTS ARE LOCATED,
AND ACREAGE.

County.	Acres.
Adams,	20,886
Bedford,	10,018
Cameron,	81,194
Centre,	79,388
Clearfield,	47,506
Clinton,	129,090
Cumberland,	20,605
Dauphin,	3,354
Elk,	14,840
Franklin,	34,528
Fulton,	6,300
Huntingdon,	57,285
Juniata,	3,178
Lackawanna,	4,956
Lycoming,	88,927
Mifflin,	49,527
Monroe,	6,401
Perry,	27,168
Pike,	57,462
Potter,	129,607
Snyder,	19,087
Somerset,	3,468
Tioga,	57,406
Union,	53,675
Westmoreland,	5,065
Wyoming,	1,177
	1,012,098

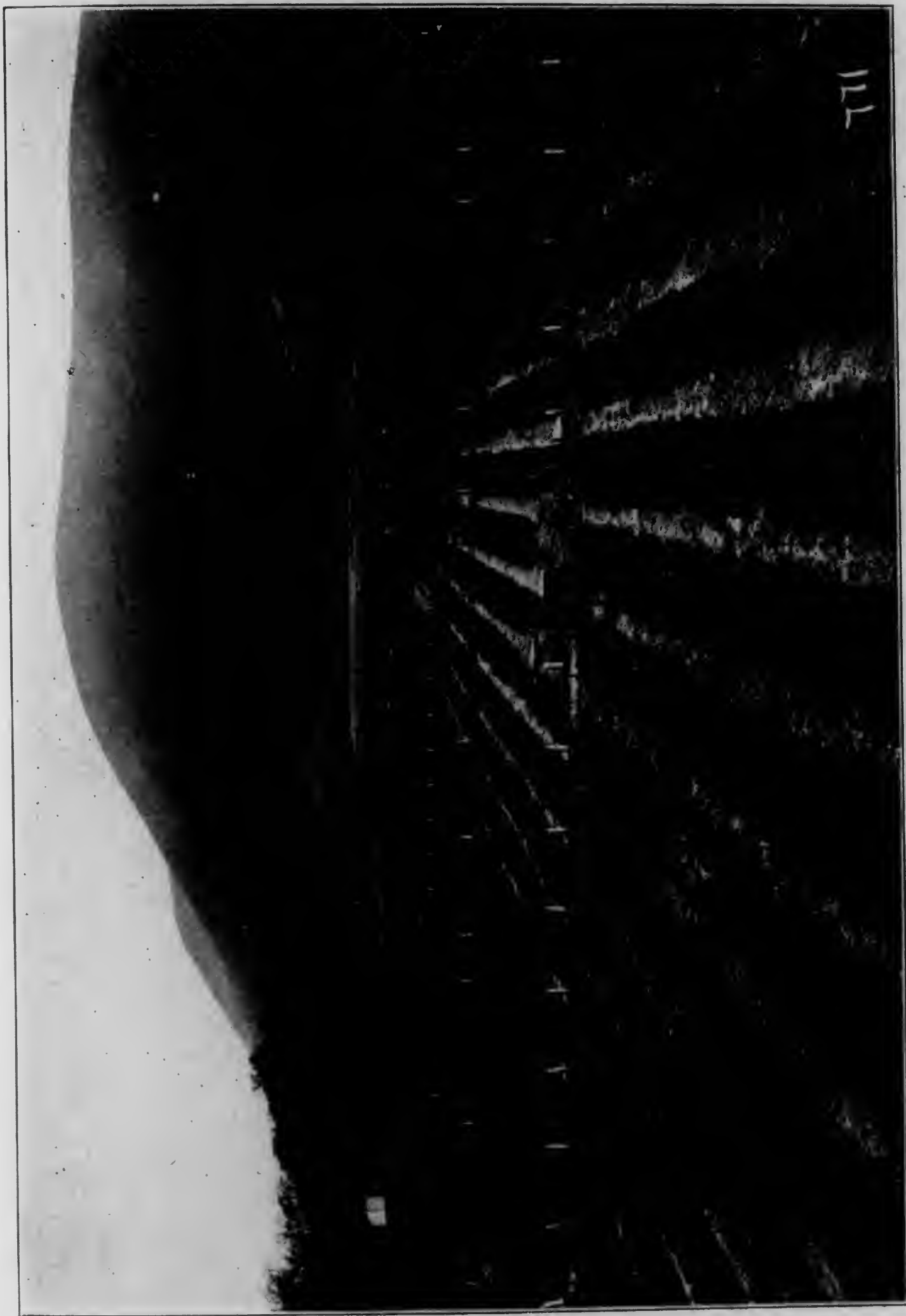


Fig. 5. How the Department of Forestry repairs the damage done by forest fires. The Asaph State Forest Nursery, which furnishes annually nearly 2,000,000 trees for reforesting.



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Fig. 6. The first stage in replacing the forest. A plantation of young forest trees



Fig. 7. A later stage—the forest replaced. Note the large trees, the smaller trees which will take their places, and the good roads.



Fig. 1. Not many years ago Pennsylvania had millions of acres like this.



Fig. 2. But forest fires followed close on the heels of the lumberman.



Fig. 3. And the fires destroyed not only the forest, but the homes and even the lives of the forest dwellers.



Fig. 4. And now Pennsylvania has 5,000,000 acres like this!

Commonwealth of Pennsylvania

DEPARTMENT OF FORESTRY

BULLETIN No. 15

Reforeesting Pennsylvania's Waste Land

What and How to Plant

BY

W. GARDINER CONKLIN.

In Charge of the Bureau of Silviculture and Mensuration



Issued by Direction of the Commissioner of Forestry

HARRISBURG, PA.:
WM. STANLEY RAY, STATE PRINTER.
1916



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INTENTIONAL SECOND EXPOSURE

PENNSYLVANIA DEPARTMENT OF FORESTRY.

Robert S. Conklin,
Commissioner of Forestry.

Irvin C. Williams,
Deputy Commissioner of Forestry.

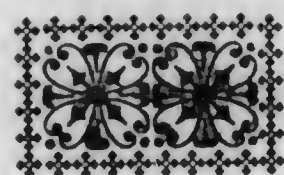
STATE FORESTRY RESERVATION COMMISSION.

Robert S. Conklin,
President.

S. B. Elliott,
Wm. P. Stevenson,
J. M. Hoffman,
George B. Lewis.

BUREAU OF SILVICULTURE AND MENSURATION.

W. Gardiner Conklin, in charge.
Raymond B. Winter, Assistant.



LETTER OF TRANSMITTAL.

Hon. Robert S. Conklin,
Commissioner of Forestry.

Dear Sir:

The many inquiries received from persons throughout the State requesting information on reforesting waste lands have prompted the preparation of this bulletin, "Reforesting Pennsylvania's Waste Land." It has been written for the purpose of advising interested persons how to reclaim their waste land, where to obtain the planting stock, the species best to plant, and how the planting should be done.

The information herein contained has been gleaned largely from data obtainable as the result of planting on Pennsylvania's State Forests. This opportunity is taken to thank the field force of foresters for supplying much of the data.

Appreciation of the assistance rendered by Prof. J. S. Illick, of the Pennsylvania State Forest Academy, who supplied the habitats of the species suggested for planting is hereby tendered.

The illustrations given are practically all from the collection belonging to the Pennsylvania Department of Forestry. Except when otherwise noted, the illustrations are from photographs taken by the author. Special mention should be made of those taken in plantations on the Jacob Nolde Estate, Berks county, by District Forester James E. McNeal.

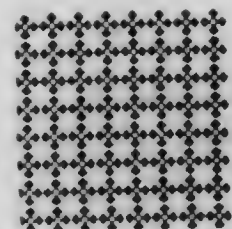
The bulletin is presented with the hope that it will be published and distributed freely throughout the State.

Very respectfully yours,

W. GARDINER CONKLIN,

In charge of the Bureau of
Silviculture and Mensuration.

Harrisburg, Pa.
November 27, 1916.



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REFORESTING PENNSYLVANIA'S WASTE LAND.

WHAT AND HOW TO PLANT.

PART I.

Introduction.

A conservative estimate places Pennsylvania's forest area at approximately 7,500,000 acres, of which 5,000,000 acres are in a non-productive condition. The remaining 2,500,000 acres are producing timber suitable for lumber. These 7,500,000 acres of land are largely mountainous and because of their steepness, rocky condition, and lack of fertility, are not adaptable for any purpose except the production of lumber. A large proportion of the 5,000,000 acres can be made productive only by the planting of forest trees, and a systematic effort should be made by every owner of such land to plant at least a portion of his holdings each year. If this be done, Pennsylvania can produce lumber sufficient not only for its own use, but can supply millions of feet annually for use outside of the State.

Why is this land in its present barren condition? It was once covered with forests, why not now? In brief, because after the original forests were cut, the land was left to take care of itself. Forest fires started and little or no attempt was made to check them unless they endangered mature growth or rural habitations. These fires burned repeatedly over the mountains, destroying all chance of natural regeneration, leaving the lands barren and waste. This condition exists particularly throughout the coal districts and the plateau region in the northern part of Pennsylvania. To the layman, the land appears entirely worthless, but not so to the forester. He sees the possibilities of the land when planted to forest trees. He also sees that protection from forest fires is the first necessity.

It is estimated that, in addition to the 7,500,000 acres of forest land, there are in Pennsylvania 2,000,000 acres of waste farm land. This land was cleared but now proves worthless for agriculture. A portion of it, no doubt, is used for grazing purposes, but undoubtedly with little success. Such land should be planted with forest trees.

WHY WASTE LANDS SHOULD BE REFORESTED.

Two of the most substantial reasons for reforesting are the need for protection of water sheds. These in themselves are sufficient but many others may be cited. The essential economic aspects, lumber production and water shed protection, are to be considered here.

Taxes are being paid annually, or supposedly so, on five million acres of land in the State from which the owners are receiving little or no return. The land represents idle capital—money,—producing no interest on the investment. Every instance of this sort means a direct financial loss to the owner.

In 1860, Pennsylvania produced more lumber than any other State in the Union. In 1880, she stood second with an annual cut of 1,733,844,000 board feet. In 1915, the reported cut was 657,853,000 board feet and her standing as a lumber producing State was twentieth. Lumbering in past years was done without apparent thought for the future. Forest fires followed lumbering, completing the destruction of our forests. Now, nearly one-fifth of the State, so far as surface value is concerned, may be classed as unproductive. The only way to reclaim this land is by artificial reforestation, i. e., planting.

Protection of water sheds is a matter of most vital interest to every resident of the State. A continuous supply of pure water is essential to health and prosperity. Where better can pure water be had than direct from forested areas? It is a fact undeniable that a more uniform flow of water is had from land covered with dense forests than from agricultural lands or waste areas. The humus of the forest floor is a sponge. It holds water, allows it to run off gradually, and thus regulates the supply. Whenever possible, watersheds, particularly the source of drinking water, should be in forest; or, if devoid of tree growth, they should be reforested by planting. Many water companies own or control a portion of the lands which are the source of their water supply. Forests on these lands would not only assure a purer and more uniform flow of water, but would eventually mean an additional source of revenue to the companies. Under proper forest management, timber may be removed without noticeable injury to the protective covering of the water shed.

CLASSES OF LAND IN PENNSYLVANIA WHICH SHOULD BE REFORESTED.

Practically all types of land in Pennsylvania which should be planted to forest trees may be placed in one of the classes described below. Much of the land given in this classification is now practically barren of commercially valuable species and must be planted to make it productive.



Photo by C. S. Bradford.

Fig. 1. WASTE AREA.

Destructive lumbering followed by forest fires have laid this land waste. It should be protected from fires and planted with trees.



Photo by Geo. H. Wirt.

Fig. 2. SCRUB OAK BARREN.

Thousands of acres of this class of land are found in Pennsylvania. The scrub oak should be replaced by planting valuable species.

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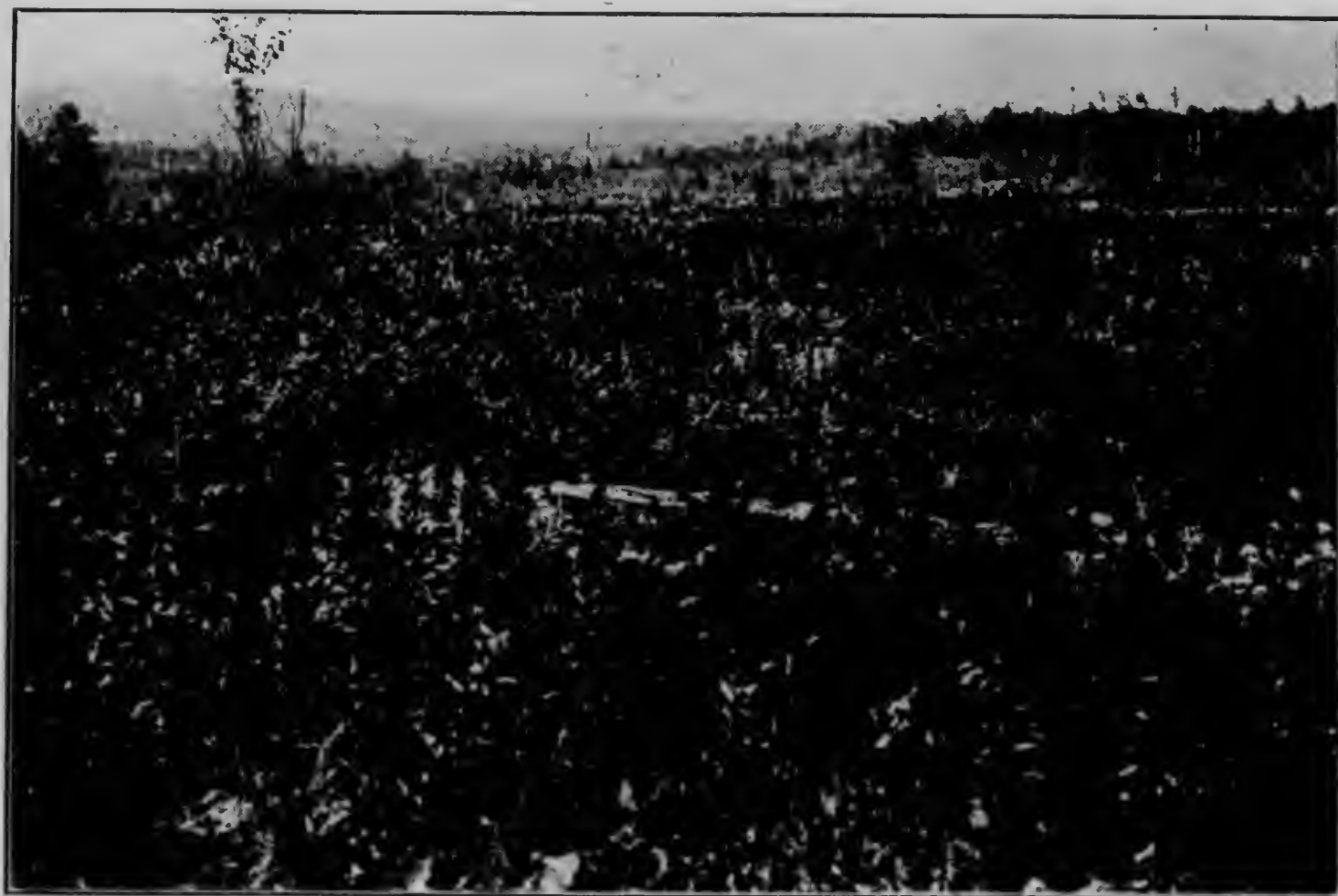


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Fig. 3. AREA OF BRACKEN AND WEEDS.

Now waste land. It once produced the best of timber. This land should be planted.



Fig. 4. BRUSH LAND.

Reproducing nothing of value. The brush was subsequently burned and the area planted with white pine, Norway spruce, and Scotch pine.

Class I. Areas originally farmed but which have proved unsuitable for agricultural purposes. Land in this class may be found in all parts of Pennsylvania, especially on steep slopes.

Class II. Farm woodlots. It frequently occurs that the woodlot contains few species of commercial value, due to improper management or other cause. These woodlots should be underplanted or reenforced with valuable species. Practically every farm has its woodlot, and many of them are in immediate need of restocking with useful species.

Class III. Second growth hardwood lands. These are producing some few trees of value but of inferior quality due to decay following injury by fires. Lands of this type are common throughout Pennsylvania and comprise a considerable part of the mountainous region in the central and southwestern portion. Much of this class of land should be underplanted with commercially valuable trees. Defective trees ought to be removed either before planting, or after the planted trees have reached a height of ten to twenty feet. They should not be cut at the expense of injury to the planted trees.

Class IV. Water sheds, particularly the source of water used for drinking purposes. Land in this class may also be included in any of the other classes.

Class V. Areas covered with bracken and sweet fern. Land of this sort is found throughout the State but more particularly on the plateau regions of the north central and northern portions. It frequently is land which originally produced the best of white pine timber, but was left to devastating fires after lumbering and is now entirely or in part, devoid of trees. Such land can be planted and made to produce lumber as good or even better than that cut from the former virgin forest. Considerable areas of this type comprising State Forests have been planted successfully by the Department of Forestry. See Figure 3.

Class VI. Coal and oil lands from which the forests have been cut and the surface severely burned. Land of this type is found in the central eastern portion of the State, and throughout the western part beyond the Allegheny Mountains.

Class VII. Scrub oak barrens, land which formerly produced valuable coniferous and hardwood timber but which was left unprotected after the timber was cut. Scrub oak, a non-commercial species and a prolific sprouter, the roots of which are seldom killed by fire, is light demanding and quickly dies out when over-topped. Planting this land is difficult and expensive, and the planted trees grow slowly. However, when they once shade the scrub oak, it quickly dies out. This type of land is found in all parts of the State but more especially east of the Allegheny Mountains.



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A PLANTATION DEFINED.

The term plantation, as used in forestry, considers the planting of an aggregation of young trees with the idea of forming a forest or woods. As used by the Department of Forestry, the term implies the contiguous area planted in any one year. In case an immediately adjacent area is planted in other years, that planting is regarded as a separate plantation. This meaning of the term has been adopted simply as an aid in systematizing planting records. A broader use of the word would allow the plantings of separate years to be conjoined as one plantation.

A plantation may be made either where no trees exist or where they do exist but not in sufficient number to produce the maximum of wood volume per unit of area. The latter is termed a "reenforcement of natural growth" and the operation that of "under planting."

Reenforcing is frequently necessary or advisable in established plantations. Not all the trees planted live and if the area planted is to be fully stocked, filling in should be done in the fail spots.

SUCCESS OR FAILURE OF THE PLANTATION.

The success or failure of a plantation depends on a great many factors, most of which may be influenced or controlled by human endeavor. Among the more important factors which influence success and which must be carefully considered before planting, are soil, climate, and existing growth; also topography, including altitude, angle of slope, and aspect. The species to be planted should be such as are adaptable to the site, that is, to the soil, topography, etc. Adverse conditions of the planting site require more careful selection of the planting stock, both in regard to species and quality of stock, and the degree of care in the planting.

To the layman the various factors influencing success are not apparent or understood, and persons are cautioned not to engage in extensive planting operations without receiving advice and suggestions from a competent authority, such as a trained forester. A forester should make a very careful examination of the planting site and consult the owner on the purpose of the planting before designating species to plant. Upon his judgment depends largely the success or failure of the venture.

SPECIES TO PLANT.

Any species of tree which grows naturally in a locality may be used, but it is best to choose such species as will produce the most valuable wood, depending, of course, on the purpose for which the plantation is made. It should be remembered that most of our hardwood or broad-leaved trees (oaks, chestnut, maples, etc.) are better capable of being reproduced naturally than are the conifers

or softwood species (pines, spruce, larch, hemlock, etc.). In consequence, by far the largest proportion of artificial reforestation is done with evergreen species. Out of a total of 22,045,311 trees planted on Pennsylvania State Forests to date, 20,828,775 were conifers.

Different species require different soil and soil moisture conditions to produce normal rate of growth and these factors must be considered in choosing the species to be planted. Among the more valuable trees to plant, and the conditions in which they may be expected to succeed best are:

CONIFERS OR SOFTWOOD TREES.*

White pine (*Pinus Strobus*).—Prefers a fertile, moist, well-drained soil, but will grow well on dry sandy soils and gravelly slopes. Common on banks of streams, river flats, in hollows and ravines, but rarely found in swamps. Any habitat in its natural range will be favorable to its development except swamps and ridges exposed to severe winds.

Pitch pine (*Pinus rigida*).—Common on dry burned-over areas, sterile plains, gravelly slopes, rocky cliffs, and sometimes found in swamps. In the glaciated area it is common on rocky glacial soil.

Red pine (*Pinus resinosa*).—Usually found on dry gravelly ridges, mountain tops, and dry sandy plains. Rare on flat lands with wet clay soil.

Short leaf pine (*Pinus echinata*).—Common on poor, sandy, or clayey soil. It is a tree of the plains and foothills. Reaches west of the Mississippi. In the east it is usually mixed with hardwoods.

Scotch pine (*Pinus sylvestris*).—This species is indifferent to soil requirements, water, heat of summer, and cold of winter. It will grow on all classes of soil, even dry, sterile sand. The rate of growth depends more on the physical structure than the chemical composition of the soil. It prefers deep well drained sandy loam. It is very intolerant of shade.

Norway spruce (*Picea Abies*).—In Europe it grows in valleys and upon the mountain slopes. It prefers rather rich moist soils, in this respect somewhat resembling the white pine. It cannot endure very dry, very sterile, or extremely rich vegetable soil. It is rather tolerant of shade and somewhat susceptible to late frosts.

European larch (*Larix decidua*).—Not native to America but planted here with every indication of success. Thrives on well-drained, deep, and moderately fertile and loose soil. Does not thrive in wet situations nor in pure sands. It is decidedly intolerant of shade. Found chiefly in the Alps and Carpathians up to about 8,000 feet.

Japanese larch (*Larix leptolepis*).—This tree is native to the central part of Japan, chiefly at high altitudes upon soil of volcanic origin. Makes its best growth in soil rich in lime and in cool to

*Habitats supplied by Prof. J. S. Illick of the Pennsylvania State Forest Academy.

cold climates. In warm climates the tree becomes branchy, the wood coarse-grained and the growth rings wide. Dr. Mays states that it will grow wherever Norway spruce thrives. Grows rapidly in youth. Falls behind the European larch about the 20th year. A specimen near Munich attained a height of 45 feet and a diameter (D. B. H.) of 11 inches in 22 years. The planting of this species is still in the experimental stage and not to be too highly recommended.

Bull pine (*Pinus ponderosa*).—Like Scotch and Jack pine, this tree is not particular to soil, but will reach good development even on arid soils and dry mountain slopes. It is one of the species best suited to dry, sandy and gravelly soils.

Jack pine (*Pinus Banksiana*).—Like Scotch pine in its habitat. Thrives on sandy, sterile soil.

HARDWOODS, OR BROAD-LEAVED TREES.*

White oak (*Quercus alba*).—It is tolerant of many soils, growing on sandy plains, gravelly ridges, rich uplands, and moist bottom lands. It reaches its best development in rich moist soil.

Red oak (*Quercus rubra*).—Prefers porous sandy or gravelly clay soil. It will not grow in wet soils and is also intolerant of shade, except when young.

Honey locust (*Gleditsia triacanthos*).—It develops best in rich soil along moist river bottoms but will grow in any fertile soil which is not too wet. It demands plenty of light.

Black locust (*Robinia Pseudo-Acacia*).—Grows vigorously on moist fertile soil, especially on rich bottom lands and along mountain streams. Also grows on rather rocky and sterile mountain slopes. Frequent on abandoned charcoal hearths and mud-dams found near ore mines.

Sugar maple (*Acer saccharum*).—It flourishes best on well drained rich soil, but will thrive even when the soil is not rich. It is common on low ridges at the base of the mountains, and along slopes. It reaches its best development in central New England, New York, northern Pennsylvania, and the Lake States.

Black walnut (*Juglans nigra*).—Prefers rich moist soil. Requires plenty of light and deep soil since it is evidently tap-rooted.

Black cherry (*Prunus serotina*).—Thrives best on rich alluvial soil and fertile slopes. It will grow on dry and often rather sterile slopes. On account of its long tap-root it requires loose deep soil.

Tulip poplar (*Liriodendron Tulipifera*).—It prefers deep, rather rich, and moist soil. Common along streams, on islands, upon semi-swampy areas, and at the base of mountain slopes. Sometimes found on the top of mountains especially where small streams and springs are prevalent. Usually occurs as scattered individuals mixed with other hardwoods and sometimes white pine and hemlock. Does not thrive on limestone soil. Common along mountain streams until they enter limestone valleys, then disappears.

*Habitats by Prof. J. S. Illick of the Pennsylvania State Forest Academy.

White ash (*Fraxinus americana*).—Prefers fertile, moist soils; very common in rich, moist woods and along streams, lakes, and other bodies of water. Occasionally found on rather dry hillsides.

Basswood (*Tilia americana*).—Rarely grows in pure stands, but usually mixed with other hardwoods. Prefers rich soils in bottom lands. It can endure considerable shade. It suffers little from windfall but occasionally from windbreak upon exposed situations.

Sycamore (*Platanus occidentalis*).—Prefers moist, fertile soil, but will grow in rather dry soil. Best development in the moist valleys of the Ohio and Mississippi rivers. It may be grown from cuttings or from seed.

Shell-bark hickory (*Carya ovata*).—Prefers rich moist soil and plenty of light. Common in the valley and in moist hillside woods. Also common along streams, and on the border of swamps.

Pignut hickory (*Carya glabra*).—Most common on dry ridges and hillsides. Rarer in swampy situations. Commonly scattered amidst our oaks and chestnut. Prefers plenty of sunlight.

Black birch (*Betula lenta*).—Usually found in rich soil and on dry slopes but also common on rocky mountain slopes and tops. Common on the rocky ridges of the South Mountains in Pennsylvania.

Beech (*Fagus grandifolia*).—Commonly found on rich moist bottom lands, but also abundant on gravelly slopes and rich uplands. It endures dense shade and variations of temperature. Rare in the limestone valleys.

Cucumber tree (*Magnolia acuminata*).—Usually found in rich woods close to streams, also inhabits slopes. In West Virginia and in this State it grows well on the soils of the carboniferous formation. It is light-demanding.

PURPOSE OF THE PLANTING.

It is pre-supposed that persons desiring to plant trees have a definite object in mind. It may be water shed protection alone or only for aesthetic purposes. More often, however, the intention of the owner of the land is to produce wood for one or more of its many uses. If the object in mind is water shed protection alone, practically any species adapted to the site may be used. If for beautifying the landscape, it is usually best to plant a variety of species. But if wood production, lumber, etc., is the main object in mind, the species used must be such as are both adapted to the site and to the use to which the wood is to be put. The following table gives a list of species suitable for different uses. The table includes only those species which it is herein suggested to plant.

TABLE NO. 1. USES TO WHICH THE VARIOUS WOODS MAY BE PUT.

General Lumber.	Paper Pulp.	Cooperage Stock.	Poles and Posts.
Practically all species which have any commercial value are used in different forms of rough or finished lumber.	Spruce. Pine. Larch. Yellow poplar. Carolina poplar. Beech. Hemlock. Maple. Basswood. Douglas fir. Bull pine. Jack pine. Sycamore.	Beech. Chestnut. Maple. Birch. Oak. Red gum. Ash. Elm. Yellow poplar. Basswood. Pine. Spruce. Sycamore.	Chestnut. Honey locust. Black locust. Red oak. Larch.
Mine Timbers.	Railroad Ties.	Hardwood Distillation.	
Oaks. Chestnut. Black locust. Honey locust. Pitch pine. European larch. Bull pine.* Jack pine.*	White oak. Red oak. Beech. Black locust. Honey locust. Pitch pine. European larch. Bull pine.* Jack pine.*	Beech. Birch. Sugar maple. Also many other hardwoods.	

*Not durable but sometimes used.

LIGHT REQUIREMENTS OF TREES.

Each species of tree has its particular requirement concerning the amount of light necessary to produce the best rate of growth. Certain species cannot survive shade and are known as intolerant or light-demanding species. Others produce satisfactory results under partial shade and are termed tolerant or shade-enduring species. In general, all the species which are advised as suitable for reforestation in Pennsylvania are light-demanding species, with the possible exception of white pine, Norway spruce, black birch, and beech. These species will endure a moderate amount of shade on good soil, particularly Norway spruce and beech.

AGE AND SIZE OF PLANTING STOCK.

The age and size of plants used depend on the type of land to be planted and the species selected. Such factors as accessibility to the planting site, distance from the nursery, and the purpose of the planting must also be considered. The rule is, the larger the seedlings, the greater the planting cost.

Adverse planting conditions require a larger and stronger plant than where conditions are more favorable to success. In order that the planting may be done at the lowest possible cost, the smallest

SEEDLINGS USED IN REFORESTING.

(Arrows point to root collars)

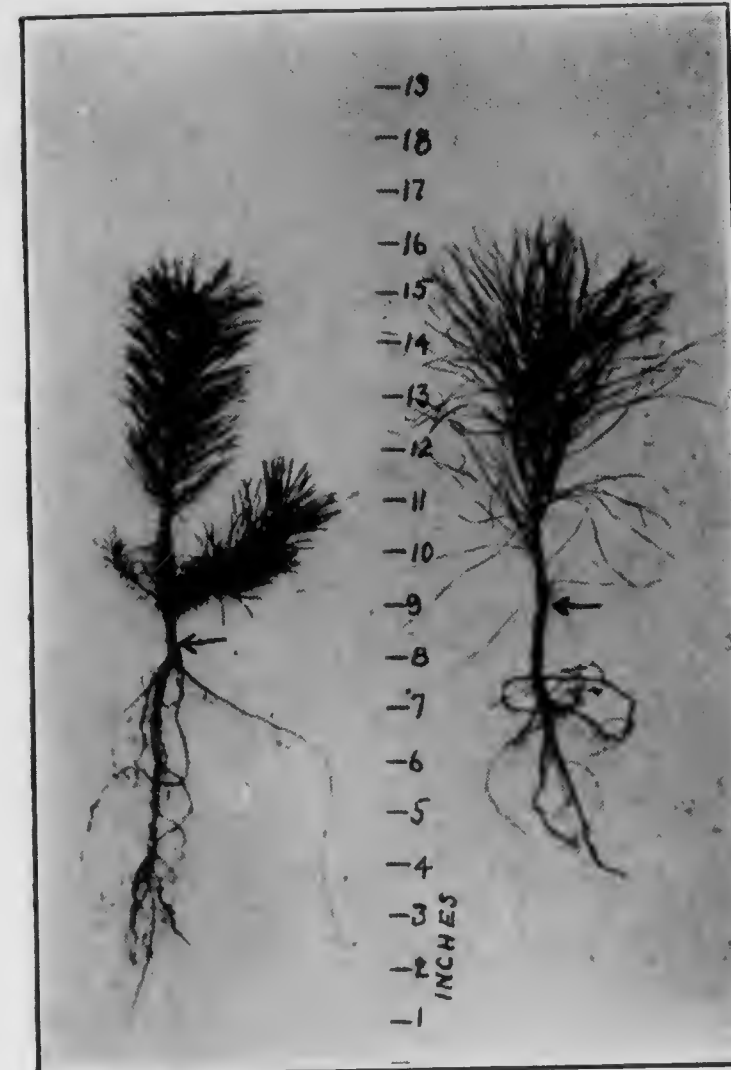


Fig. 5. Pitch pine (left) and Scotch pine (right), two years old.

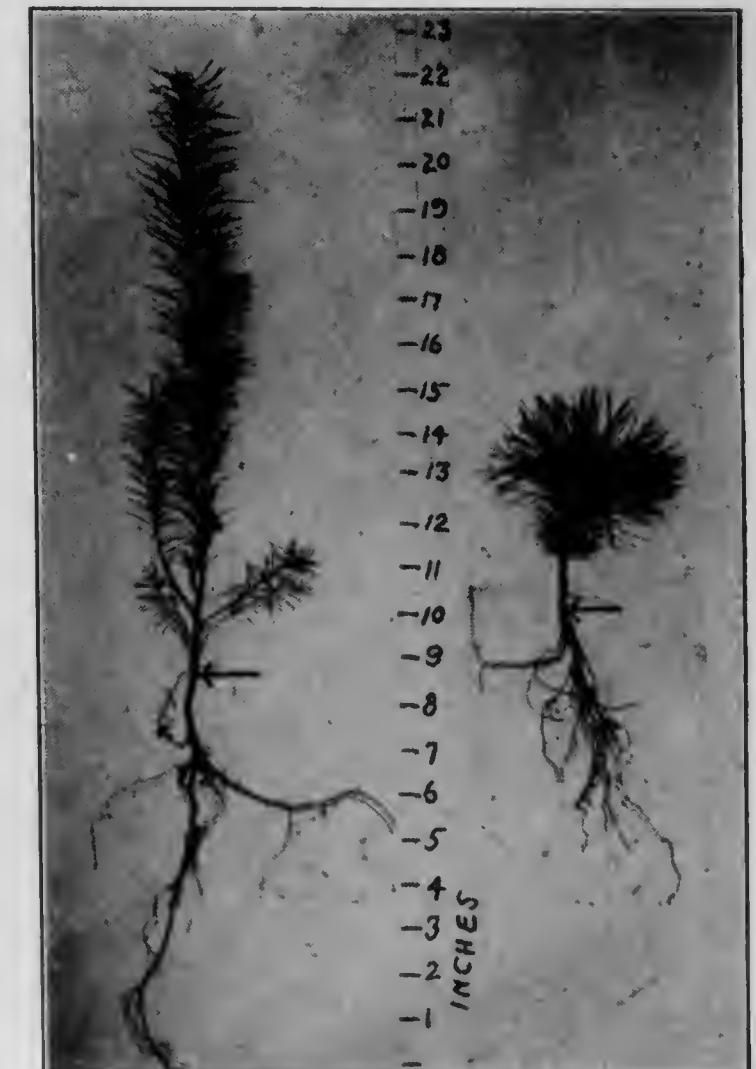


Fig. 6. Japanese larch (left) and white pine (right), two years old.



Fig. 7. Norway spruce (left) and white pine (right), three years old.



Fig. 8. A bunch of 50 white pine seedlings, two years old, ready for packing and shipping.

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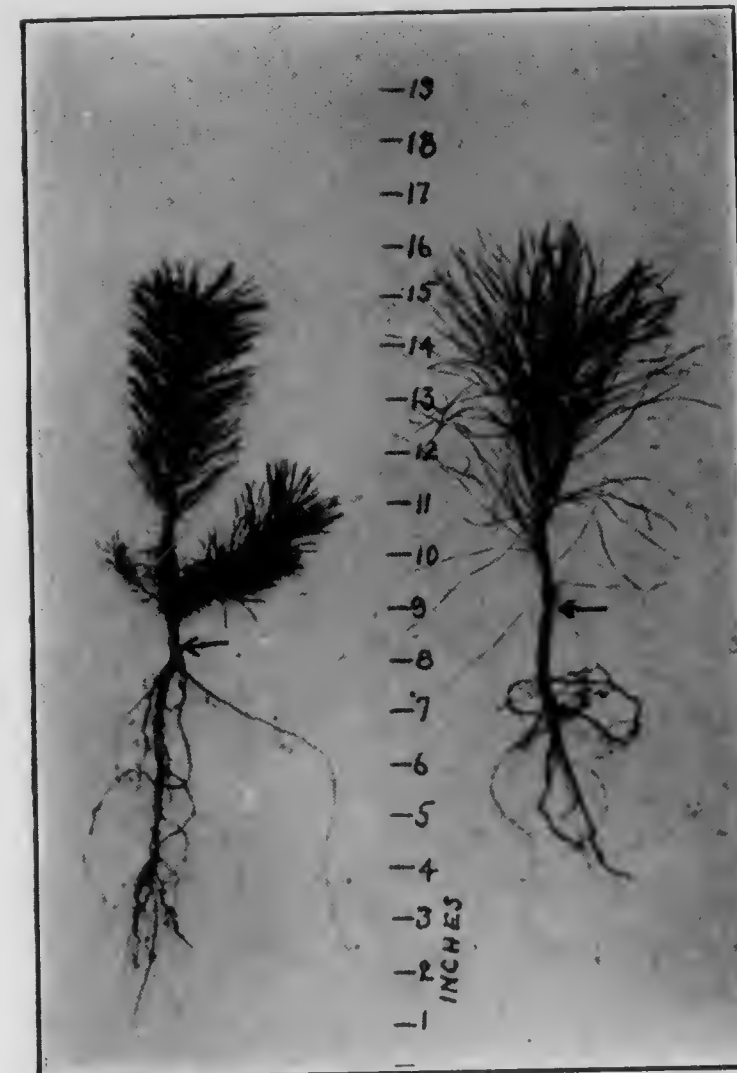


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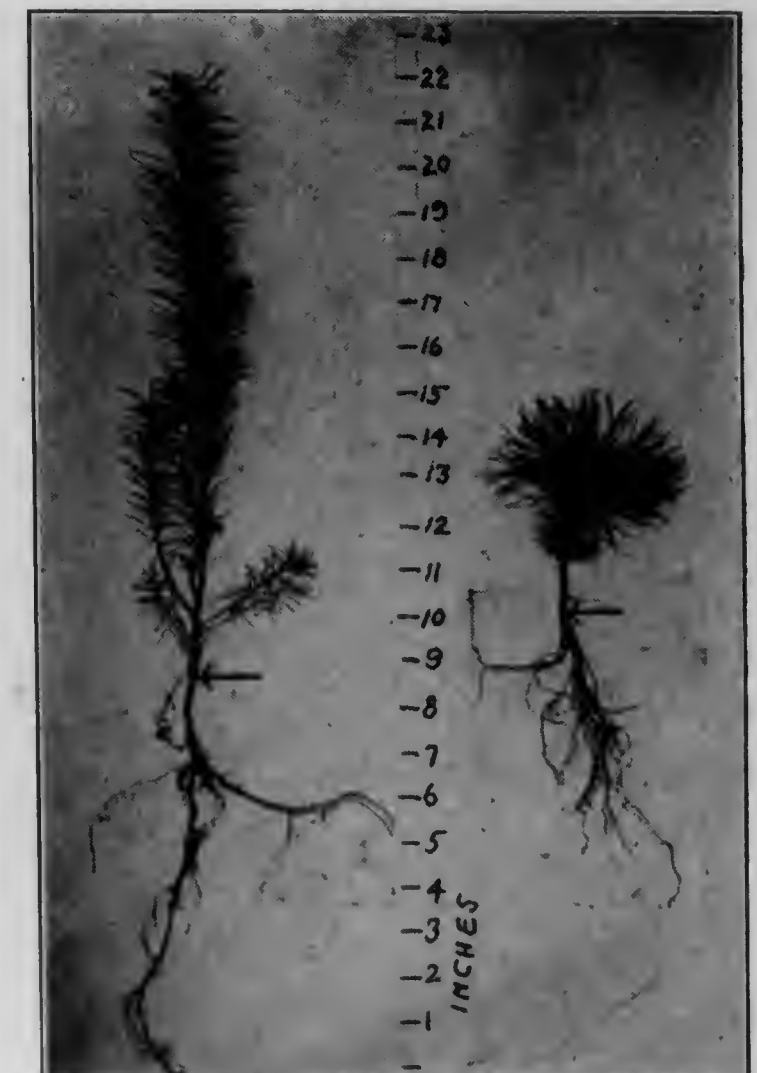


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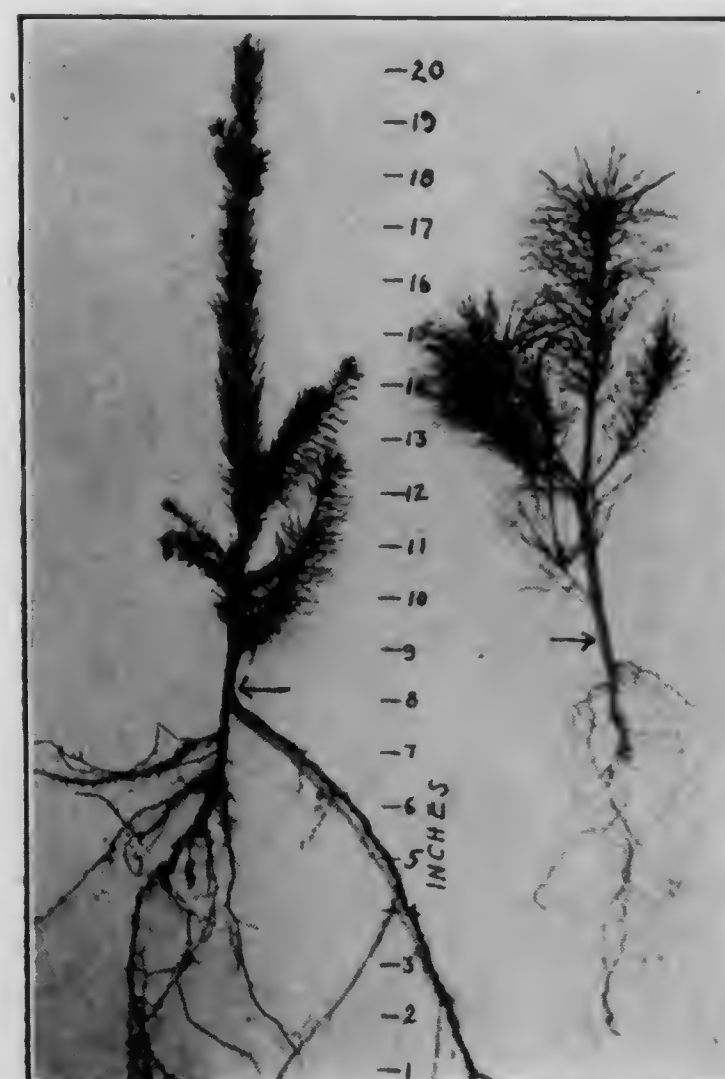


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Fig. 9. CARE OF PLANTING STOCK.
25,000 seedlings "heeled in" preparatory to planting.



Photo by Geo. H. Wirt.

Fig. 10. PREPARATION BEFORE PLANTING.
This area was cleared of brush, then planted. It is too expensive to be practical.

seedlings suitable for any particular site should be selected. The layman usually desires quick results and in consequence asks for large plants. Economically considered, this is poor policy because of the increased cost of planting. Also, where too large seedlings are used, the chance of obtaining a good percentage of establishment is lessened unless unusual care is used in the planting.

Broad-leaved species may usually be planted when one year old. If left more than one year in the nursery, providing proper development is obtained, long tap roots result and require pruning. Even one year old broad-leaved species may have to be pruned. This increases the cost of the plantation and reduces the chance of obtaining good establishment. One year old broad-leaved species range in height from 6 to 12 inches above the collar, and the roots frequently are still longer. In 1916, a total of 153,010 hardwood seedlings were planted on State Forests and of this number only 12,000 were other than one year old. These were white ash which had been injured by frost while in the nursery and not of sufficient size at one year to warrant placing them in permanent plantation.

Coniferous plants used for reforestation on State Forests vary in height from 4 to 12 inches and are two or three years old. By far the largest percentage of seedlings used in planting on State Forests have been two year olds. In 1916, a total of 5,339,010 conifers were planted, and of this number 5,255,420 were two year stock.

It is seldom advisable to plant other than two year old pitch pine, Scotch pine, or European larch. White pine two years old is generally large enough. However, if adverse soil, moisture, and shade conditions must be overcome, three year stock, particularly white pine, had better be used. In this State, experience has demonstrated that three year old Norway spruce should be used, for uniformity in size is seldom had in the nursery beds and if taken from the nursery when two years old, a large percentage of the seedlings will be undersized and too small to plant out.

Figures 5, 6, 7, and 8 are from photographs of seedlings two and three years old. Stock such as there shown is used for planting by the Department of Forestry. The scale given represents size of seedlings in inches. Arrows indicate the collar of the plant, which is the point marked by the surface of the ground.

The age of seedlings is reckoned by the number of growing seasons they have passed in the nursery beds. Occasionally seedlings are transplanted in the nursery when one or two years old and are known as transplants. Their age is given as 1-2 years, 2-1 years, etc. The first numeral indicates the number of years in seed beds and the second the number of years in transplant beds. A 1-2 transplant has passed through three growing seasons in the nursery.



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TIME TO PLANT.

Reforestation may be done either in spring or fall, preferably spring. Experiments with fall planting have been made on State Forests but gave unsatisfactory results. It was found that a large proportion of the small trees were lifted out of the ground by the following spring. The cause of this was freezing and thawing of the ground before the roots could properly grip the soil. Planting in the spring should be done between the time frost is out of the ground and the time when the buds begin to shoot out the new year's growth. The season in the southern part of the State begins about the last week in March and ends about the last week in April. In the northern part of Pennsylvania the planting season is from one to three weeks later, depending upon altitude.

CARE OF PLANTING STOCK.

Planting stock from State forest nurseries is given careful attention before being shipped. The small trees are lifted from nursery beds in such manner as to do the least possible injury to the roots. This is particularly true of conifers since their roots are more susceptible to permanent injury than those of hardwoods. After lifting, they are counted and tied in bunches of 50 or 100, depending on their size. (See Fig. 8.) The roots of coniferous seedlings are then dipped in a "puddle" of thin mud to prevent drying out. The bunches are then packed in boxes in layers, roots toward the center of the box. Wet sphagnum moss is packed around the roots to keep them moist while in transit. Tops are not moistened.

Shipments of 2,000 or less seedlings are sent by parcel post in paste board boxes. Large shipments are sent by express either in wooden boxes or crates.

Seedlings should never be left in the shipping boxes any longer than necessary, but should be unpacked immediately upon receipt and either planted at once or "heeled in" at or near the planting site.

The number of bundles in the shipment should be counted as removed from the packing boxes and the number of seedlings counted in several bunches. This is to check up the number of seedlings received.

"Heeling in" is done to prevent the roots from drying out. A trench is dug with a spade or plow, deep enough to take care of the roots without crowding. The bundles of seedlings are then taken from shipping boxes, the string cut, and the seedlings spread out along the side of the trench away from the excavated soil with tops above the surface of the ground. (See Fig. 9.) The soil is then pushed into the trench covering the roots and firmed with the foot.

It is best to dip the roots in a "puddle" of thin mud before placing them in the trenches, but keep the tops dry. One bundle of seedlings should be given about six inches of space in the trench.

For "heeling in," select a site close to where the plantation is to be made, and where water is near at hand. It should be partly or wholly under shade but where there is a good circulation of air. The soil should be moist but not wet.

PREPARATION BEFORE PLANTING.

Little previous preparation of the area to be planted is necessary in this State. Occasionally where soil conditions allow, the ground is plowed and harrowed. If this can be done at a nominal cost, say \$5 per acre, the plantation may still result in producing a fair rate of interest on the investment. However, such preparation of the area is beneficial only to a comparatively small extent. A large percentage of the planted seedlings may be expected to live and produce a slightly better rate of growth, but this would only be noticeable for a few years after planting. As a rule, it is not advisable.

In other cases, as on scrub oak barrens, all or part of the existing growth is removed and burned. Such clearing of land has been experimented with on State Forests to an extent sufficient to warrant advising against it. (See Figs. 4 and 10). First, the cost of clearing is very high, reaching as much as \$50 per acre. This, in itself, makes clearing of the area prohibitive if the plantation is to become financially profitable. Second, it has been found that sprouts from the stumps grow much faster than the planted trees and produce a much denser growth than before clearing. In consequence, the planted trees suffer from lack of sunlight and frequently die.

SPACING.

Various spacing distances for planting are in common use in this State. In most cases an attempt is made to space the seedlings at regular intervals in the rows and the rows are then spaced the same distance apart. This is not always possible, especially in "under-planting," for existing growth prevents regularity. When cleared ground is to be planted, straight rows and regular spacing can be followed.

The number of seedlings required per acre for different spacing distances is shown in the following table.

TABLE NO. 2. NUMBER OF SEEDLINGS PER ACRE WITH DIFFERENT SPACING DISTANCES.

Spacing.	Number per Acre.
3 ft. x 3 ft.,	4,840
4 ft. x 4 ft.,	2,722
5 ft. x 5 ft.,	1,742
6 ft. x 6 ft.,	1,210

Close spacing of trees in plantation is practiced in order that the crowns of the trees may form a closed canopy over the ground in a minimum number of years. The aim is to shade out and kill the lower branches, causing natural pruning to take place. This results in producing lumber comparatively free of knots, also forces height growth of the tree with a minimum amount of taper. Either 4 ft. x 4 ft. or 5 ft. x 5 ft. spacing is recommended for Pennsylvania conditions.

MIXTURE OF SPECIES.

Plantations may be made pure, that is, using one species only, or in mixture, using two or more species in the same plantation. Several different methods of mixing are followed, viz.:

- Group mixtures.
- Alternating by rows.
- Alternating in the rows.

By the group mixture is meant the planting of different species in pure groups, the groups being adjacent to one another, as illustrated by Fig. 1, Plate I.

The method of alternating by rows is illustrated by Fig. 2, Plate I, showing how it may be done when either two or three species are mixed. Fig. 3, Plate I, shows two methods of mixing by alternating in the rows. Innumerable other combinations of mixtures are possible but more or less impracticable. The more complicated the mixture, the greater the cost of planting.

Many factors govern the advisability of planting in mixture. Three of the most important to be considered are:

1. Kind of soil and amount of soil moisture.
2. Light requirements of the species.
3. Rate of growth of the species.

A slow growing intolerant species should not be planted in mixture by the last two described methods, alternate rows or alternating in the rows. But a slow-growing tolerant species may be placed with an intolerant one providing both species are adapted to soil and other conditions of the site to be planted. For instance, white pine and Norway

PLATE I METHODS OF MIXING SPECIES IN PLANTATIONS.

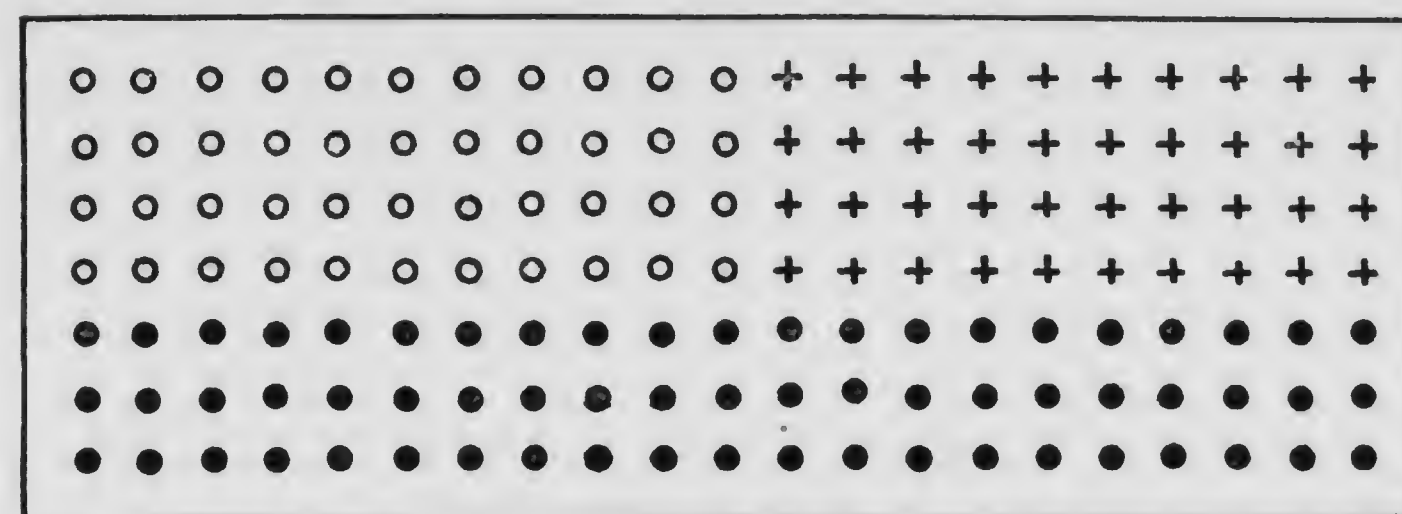
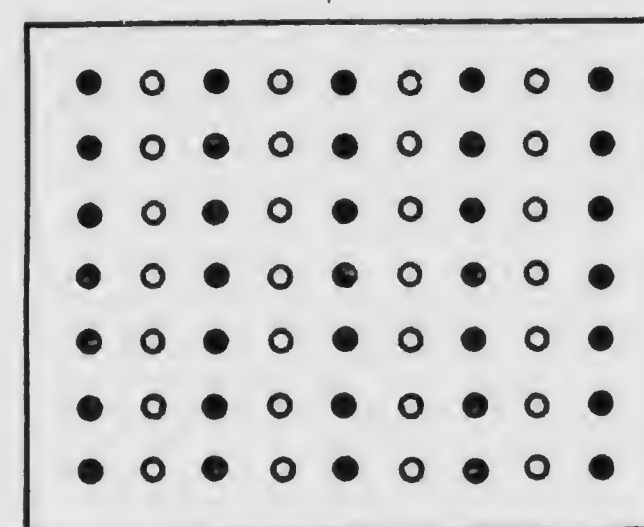
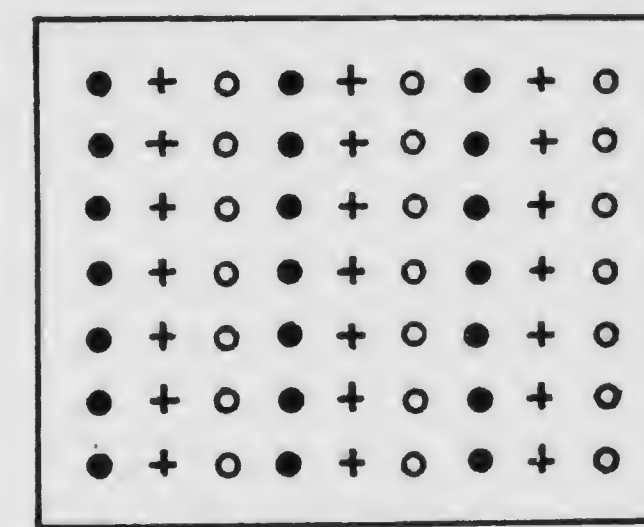


Fig. 1 GROUP MIXTURE.

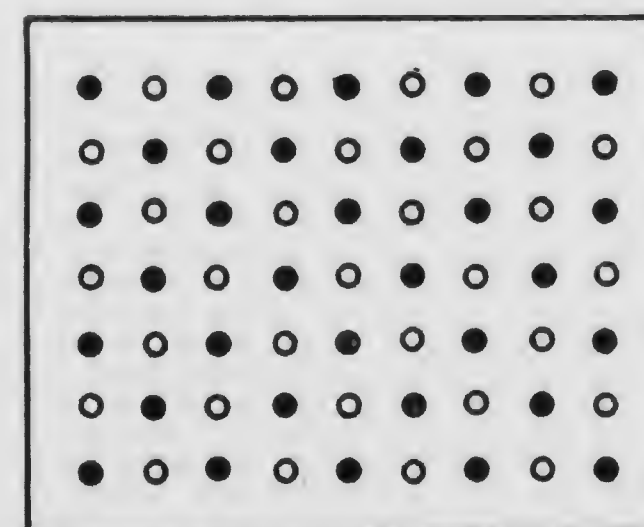


Using two species.

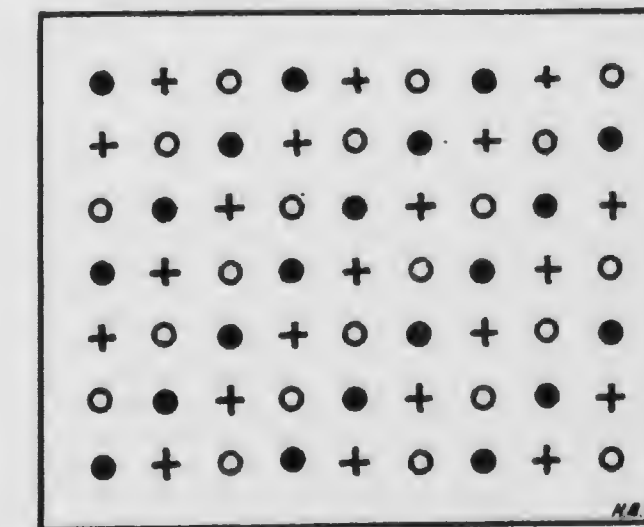


Using three species.

Fig. 2. ALTERNATING BY ROWS.



Using two species.



Using three species.

Fig. 3. ALTERNATING IN THE ROW.

Symbols represent different species.

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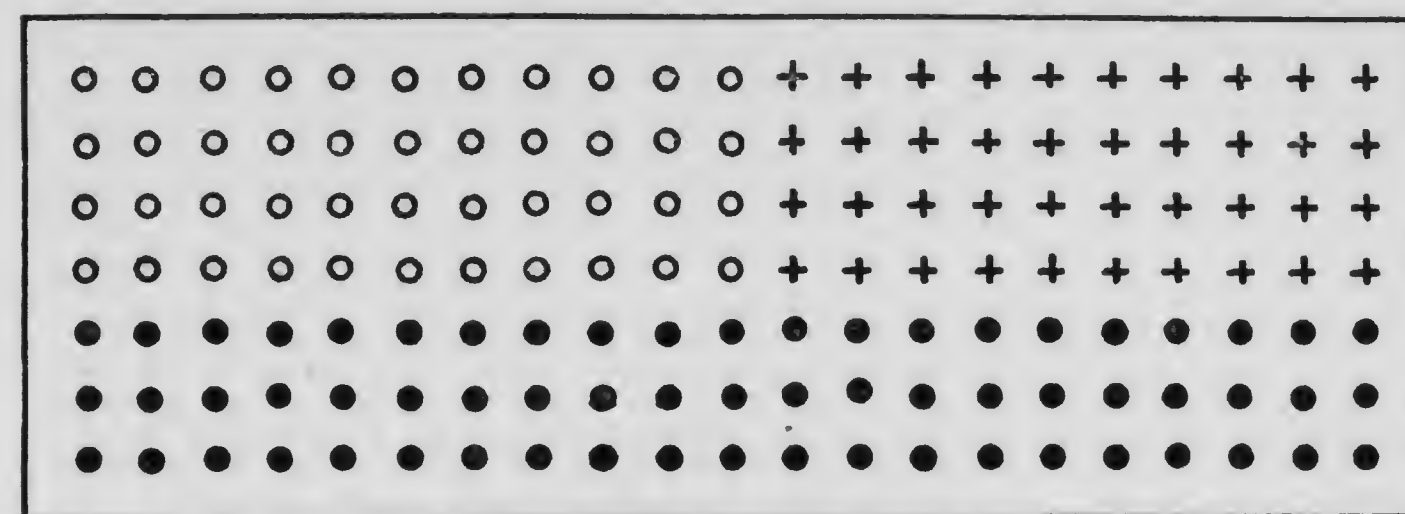
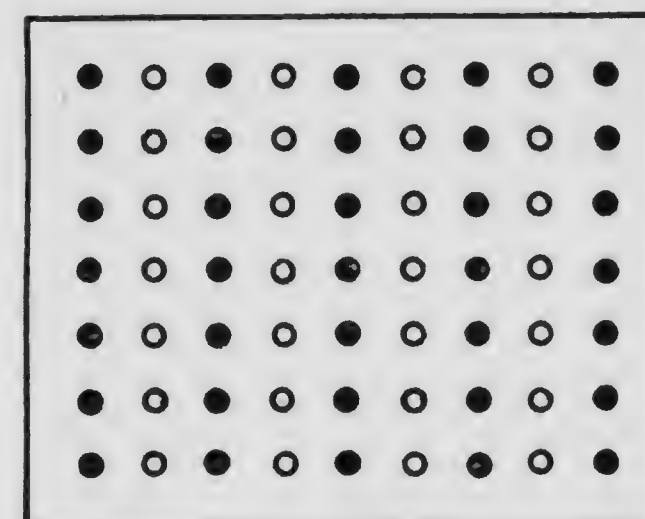
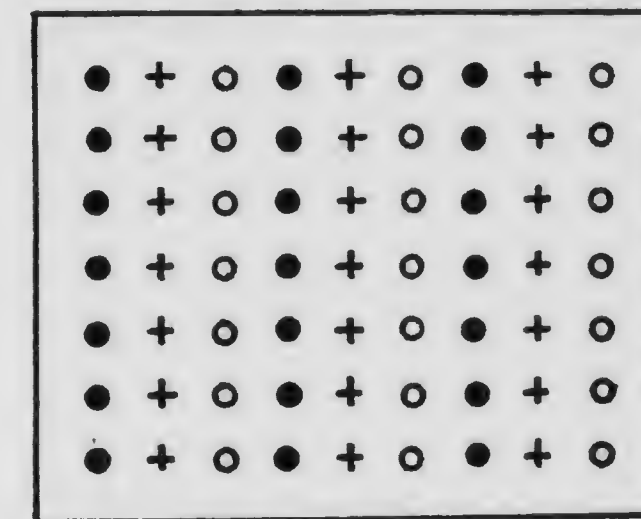
PLATE I
METHODS OF MIXING SPECIES IN PLANTATIONS.

Fig. 1 GROUP MIXTURE.

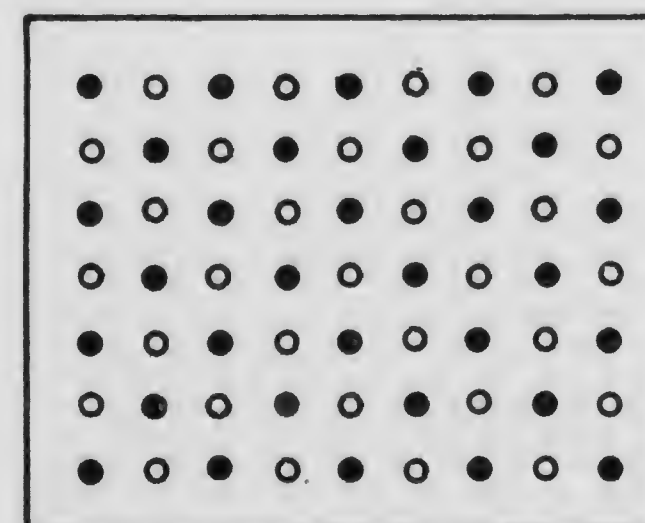


Using two species.

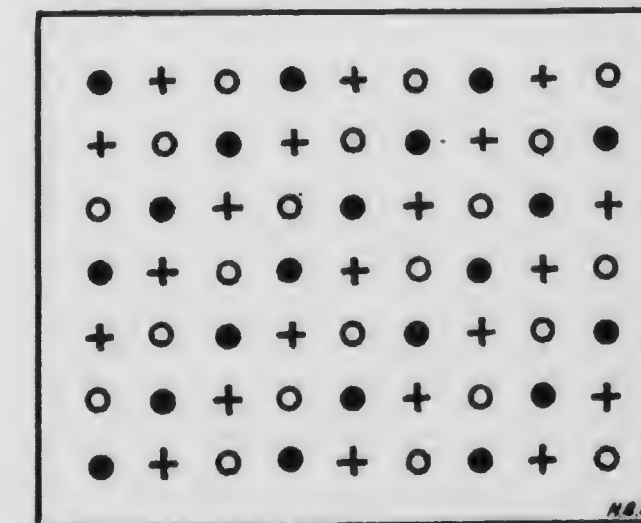


Using three species.

Fig. 2. ALTERNATING BY ROWS.



Using two species.



Using three species.

Fig. 3. ALTERNATING IN THE ROW.

Symbols represent different species.

DIGGING THE HOLE IN WHICH TO PLANT A SEEDLING.



Fig. 11. First stroke with the mattock.



Fig. 12. Removing dirt from the hole.

Fig. 14. Tamping soil around roots, using a stone.



Fig. 13. Placing seedling in the hole.



PLANTING A SEEDLING.

PLANTING CREWS AT WORK.



Photo by R. G. Conklin.

Fig. 15. Planting on land cleared of brush.



Photo by R. G. Conklin.

Fig. 16. Planting in brush.

spruce may be mixed with practically all of the species herein advised to plant. Where any particular species is subject to injury or destruction by insects or fungous diseases, it is well to plant such species in mixture with other species not liable to attack by that particular insect or fungus. For example, the white pine weevil is doing considerable damage in this State to white pine. In consequence, it is not advisable to plant white pine in pure stands, but it may be mixed with any of the species herein advised to plant.

METHOD OF PLANTING.

DIGGING THE HOLE.—The method of planting adaptable to Pennsylvania conditions is to plant the trees in holes dug with a mattock or grubbing hoe. The method of digging the holes most commonly followed is shown by Figs. 11 and 12. The digging end of the mattock only is required. One stroke is usually sufficient to loosen the soil, and one or more additional strokes to draw the loosened soil from the hole, leaving it in a mound at the edge. Where planting is to be done in heavy sod, two parallel cuts, six or eight inches long and about four inches apart, should be made with the cutting end of the mattock. A third stroke with the digging end of the mattock turns back the sod.

SETTING THE SEEDLING.—The tree to be planted is held between the thumb and finger of the left hand at the root collar (See Figs. 5, 6 and 7), and lowered into the hole until the root collar is level with the ground, the roots resting against the side of the hole. The dirt is then drawn back into the hole with the right hand and firmed about the roots either with a planting mallet or stone, or with the foot. (See Figs. 13 and 14.) The following rules should be observed generally in setting the plant.

1. See that the root collar comes about level with the ground.
2. Spread out the roots, putting them as nearly as possible in the position they originally had in the nursery.
3. See that the roots are pointing downward, not bent upward.
4. Have the stem of the plant as nearly erect as possible.
5. See that soil and not vegetable matter (grass, dead leaves, etc.) comes into contact with the roots.
6. Try to bring moist soil into contact with the roots.
7. Firm the soil well around the roots so that the plant cannot easily be pulled out.
8. Keep the roots moist until planted.

THE PLANTING CREW.—The number of men required in the planting crew depends upon the extent of the planting. Experienced men on different classes of land will plant anywhere from 500 to 1,000 seedlings in a day. The better the planting conditions, the greater the number which may be planted per man per day. One man can

PLANTING CREWS AT WORK.



Photo by R. G. Conklin.

Fig. 15. Planting on land cleared of brush.



Photo by R. G. Conklin.

Fig. 16. Planting in brush.

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4. Have the stem of the plant as nearly erect as possible.
5. See that soil and not vegetable matter (grass, dead leaves, etc.) comes into contact with the roots.
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plant about as fast as another can dig the holes (See Figs. 15 and 16). In consequence the crew is made up of about the same number each of mattock men and planters. As a rule, two experienced men should be provided for each 10,000 seedlings to be planted. If 100,000 seedlings are to be planted, the crew should include ten mattock men and ten planters.

In addition to the mattock men and planters, an additional man or boy is sometimes provided for each five planters. It is his duty to carry the seedlings to the planters and to drop one in each hole. The plants are usually carried in buckets partly filled with thin mud, called "puddle." If there are ten planters, two "droppers" or plant distributors should be provided. One foreman to every twenty men should be charged with the duty of seeing that the seedlings are properly planted.

COST OF PLANTING.

Planting costs vary widely with the many different soil and growth conditions encountered. Where abandoned farm lands are to be planted, the ground may be plowed and harrowed, making planting easy and usually cheaper. Of course, this preparation of the soil, plowing and harrowing, is an item of expense against the planting, but even with this included, the cost should be less than when planting is done where the soil is stony, or where the existing growth is scrub oak, etc.

On Pennsylvania State Forests planting has been done under conditions many and varied, and usually more or less adverse. In all costs herein given for State forest planting, supervision charges are included. The cost of planting per thousand seedlings has varied widely for the different Forests in different years. The first planting on State Forests was done in 1899. Since that time to the end of the year 1915, a total of 16,553,291 seedlings were planted at a cost of \$52,919.25, making an average of \$3.20 per thousand for planting. For 1915 alone, the average cost was \$2.95 per thousand. In that year a total of 4,349,386 seedlings were planted, so this average cost per thousand is a very fair one. The lowest cost was obtained on the Pine Grove Forest where girls and boys were used, the average for planting 141,500 seedlings being \$1.28 per M. This was unusually low and is not a fair criterion of cost. Where small plantations, say of only a few thousand seedlings, are made, the cost will run higher than for large ones.

The cost of planting per acre depends also on the spacing which regulates the number of seedlings required per acre. As a rule, either 4 ft. x 4 ft. or 5 ft. x 5 ft. spacing is recommended. Where 4 ft. x 4 ft. spacing is used, 2,722 seedlings are required and the planting cost per acre would be about \$8.00. If 5 ft. x 5 ft. spacing is fol-

lowed, 1,740 seedlings are used and the cost would average about \$7.00. But it should not be overlooked that to produce lumber free of knots close planting of the seedlings is required.

The cost of planting, of course, is a factor regulating the financial returns from the investment and to gain the best possible rate of interest on the investment requires the lowest possible cost for making the plantation. However, careful planting must not be sacrificed to keep down the cost a dollar or two per acre. The success of the plantation depends largely on the care given the seedlings before planting and that with which the seedlings are planted.

RATE OF GROWTH.

The rate of growth of planted trees varies widely for different species on different soils and on the different classes of land. Slow growth may be expected on poor soils. However, soils considered too poor for agriculture may be good for wood production. Even though the soil be regarded good for forest trees, if the growth present before planting is bracken or scrub oak, slow growth may be expected until the planted trees are able to overtop the weed species and thus get the advantage of more sunlight (see Fig. 17). On the other hand, on the more open sites, as abandoned farm lands usually are, rapid growth may be expected.

The rate of growth of a number of different species of trees planted on various sites is shown by Tables Nos. 3 to 8 inclusive. These tables were prepared from measurements taken in plantations during the fall of 1916 on Pennsylvania State Forests and on the Jacob Nolde Estate, Berks County, Pa. Average heights are based on measurements of from 100 to 500 trees.

At the head of each column of heights is given a very brief description of the site planted and the age of the planting stock. The "Age of Trees from Seed," given in the first column, is the number of growing seasons through which the trees have passed, including years in the nursery.

The reason for presenting these tables is to give the layman an idea of the rate of growth which he may expect for his plantations. On very favorable sites, a more rapid rate of growth may be counted on than given in the tables. A slower growth rate may be obtained where the plantation is made under more adverse conditions. It will be noted that very slow growth is usually had in plantations the first three to five years after planting, the trees requiring time to adapt themselves to changed conditions. Frequently no appreciable growth whatever is made during the first year or two. When they once become established and overtop brush and weeds, rapid growth, that is, a foot or more a year, may be expected.

TABLE NO. 3. HEIGHT GROWTH OF WHITE PINE (*P. STROBUS*) IN FOUR DIFFERENT PLANTATIONS.

Age of Trees from Seed (Years).	Description of the Plantations.			
	Mont Alto State Forest. Soil—Sandy loam. Area originally cultivated. Altitude 1600 ft. Aspect—S. E. 2 yr. seedlings planted in 1902, spaced 4'x 4'.	Caledonia State Forest. Soil—shale and loam. Area originally cultivated. Aspect—Western. 2 yr. seedlings planted in 1906, spaced 4'x 4'.	Greenwood State Forest. Soil—rich sandy loam, heavy sod. Area originally cultivated. Altitude 1,000 ft. Aspect—Southern. 2 yr. seedlings planted in 1909, spaced 4'x 4'.	Jacks Mountain State Forest. Soil—dry, very sandy. Brush land, severely burned. Altitude 1,500 ft. Aspect—Northern. 2 yr. seedlings planted in 1909, spaced 4'x 4'.
Average Heights at End of Year's Growth (feet).				
3	.4	....	....	.2
4	.6	....	1.1	.4
5	1.2	....	1.2	.6
6	1.9	....	1.5	.9
7	2.8	2.2	2.1	1.0
8	4.0	3.6	2.8	1.3
9	5.3	5.3	3.7	1.5
10	6.6	6.7	5.1	1.8
11	7.6	8.0	....	....
12	8.8	9.6	....	....
13	10.1	11.8*	....	....
14	11.3	....	....	....
15	12.3	....	....	....
16	13.5	....	....	....
17	14.9†	....	....	....

†Average diameter, $4\frac{1}{2}$ ft. above ground, in 1916, was 2.4 inches. See Figs. 22, 23, 24 and 25.
 *Average diameter, $4\frac{1}{2}$ ft. above ground, in 1916, was 1.9 inches.

TABLE NO. 4. HEIGHT GROWTH OF SCOTCH PINE (*P. SYLVESTRIS*) IN FOUR DIFFERENT PLANTATIONS.

Age of Trees from Seed (Years).	Description of the Plantations.			
	Mont Alto State Forest. Soil—sandy loam. Area originally cultivated. Altitude 900 ft. Aspect—S. E. 2 yr. seedlings planted in 1909, spaced 4'x 4'.	Stone State Forest. Soil—shallow loam. Area grown up with sod and brush. Altitude 1,200 ft. Aspect—N. W. 2 yr. seedlings planted in 1909, spaced 5'x 5'.	Pennypacker State Forest. Soil—blue and red shale. Area originally cultivated. Altitude—1,050 ft. Aspect—S. E. 2 yr. seedlings planted in 1909, spaced 4'x 4'.	Jacks Mountain State Forest. Soil—dry, very sandy. Brush land, severely burned. Altitude 1,500 ft. Aspect—Northern. 2 yr. seedlings planted in 1909, spaced 4'x 4'.
Average Heights at End of Year's Growth (feet).				
3	.7	.6	....	.5
4	1.0	1.0	1.4	.7
5	1.6	1.7	2.0	1.2
6	2.7	2.7	3.0	1.5
7	4.1	3.7	4.4	1.8
8	6.1	4.9	5.8	2.1
9	8.3	6.4	7.8	2.6
10	10.9	7.8	10.3	3.1

TABLE NO. 5. HEIGHT GROWTH OF PITCH PINE, BULL PINE, AND JACK PINE IN PLANTATIONS.

Age of Trees from Seed (Years).	Description of the Plantations.			
	Pitch Pine (<i>P. rigida</i>).	Bull Pine (<i>P. ponderosa</i>).		Jack Pine (<i>P. Banksiana</i>).
	White Deer State Forest. Soil—sandy. Scrub oak area. Altitude 2,000 ft. Practically level. 2 yr. seedlings planted in 1913, spaced 5'x 5'.	Mont Alto State Forest. Soil—sandy. Area originally cultivated. Altitude 950 ft. Aspect—S. E. 2 yr. seedlings planted in 1908, spaced 5'x 5'.	Jacob Nolde Estate, Reading, Pa. Soil—sandy loam. Area originally cultivated. Altitude 800 ft. Practically level. 2 yr. seedlings planted in 1911, spaced 3½'x 4'.	Jacob Nolde Estate, Reading, Pa. Soil—sandy loam. Area originally cultivated. Altitude 800 ft. Aspect—S. W. 2 yr. seedlings planted in 1910, spaced 3'x 4'.
Average Heights at End of Year's Growth (feet).				
2	.6	.4	.4	....
3	.9	.7	.7	....
4	1.5	1.1	1.3	....
5	2.0	1.3	2.1	....
6	2.4	1.8	3.0	....
7	....	2.4	4.3	5.8
8	....	3.0	5.7*	8.0
9	....	3.8	....	10.4†
10	....	4.5	....	....
11	....	5.5	....	....

*See Fig. 28.

†Average diameter, $4\frac{1}{2}$ ft. above ground, was, in 1916, 1.3 inches. See Fig. 27.

TABLE NO. 6. HEIGHT GROWTH OF EUROPEAN LARCH AND JAPANESE LARCH IN PLANTATIONS.

Age of Trees from Seed (Years).	Description of the Plantations.			
	European Larch (<i>Larix decidua</i>).			Japanese Larch (<i>Larix leptolepis</i>).
	Mont Alto State Forest. Soil—moist, sandy loam. Area originally cultivated. Altitude 900 ft. Aspect—S. E. 2 yr. seedlings planted in 1909, spaced 4'x 4'.	Stone State Forest. Soil—dry, sandy loam. Area grown up with brush and sod. Altitude 1,100 ft. 3 yr. seedlings planted in 1910, spaced 4'x 4'.	Austin State Forest. Soil—red shale. Brush land cleared previous to planting. Altitude 1,300 ft. Aspect—S. W. 2 yr. seedlings planted in 1910, spaced 4'x 4'.	Jacob Nolde Estate, Reading, Pa. Soil—deep sandy loam. Area cleared of brush previous to planting. Altitude 700 ft. Aspect—N. E. 2 yr. seedlings planted in 1909, spaced 3½'x 4'.
Average Heights at End of Year's Growth (feet).				
3	.5	....	....	....
4	.7	1.0	1.4	....
5	1.2	1.7	1.7	....
6	2.0	2.7	1.9	....
7	2.8	3.8	2.1	....
8	4.9	5.7	3.0	....
9	7.1	8.2	4.6	....
10	9.6	10.4	6.3	16.9*

*Average diameter, $4\frac{1}{2}$ ft. above ground, was, in 1916, 1.6 inches.

TABLE NO. 7. HEIGHT GROWTH OF NORWAY SPRUCE AND DOUGLAS FIR IN PLANTATIONS.

Age of Trees from Seed (Years).	Description of the Plantations.			
	Norway Spruce (<i>Picea Abies</i>).			Douglas Fir (<i>Pseudotsuga taxifolia</i>).
	Austin State Forest. Soil—red shale. Site originally farmed. Cultivated. Altitude 1,300 ft. Aspect—S. E. 3 yr. seedlings planted in 1910, spaced 4' x 4'.	Stone State Forest. Soil—sandy loam. Brush land. Altitude 1,130 ft. Aspect — North-ern. 3 yr. seedlings planted in 1910, spaced 5' x 5'.	Jacob Nolde Estate, Reading, Pa. Soil—sandy loam. Brush land, cleared before planting. Altitude 700 ft. Aspect—Eastern. 4 yr. transplants planted in 1909, spaced 3½' x 4'.	Jacob Nolde Estate, Reading, Pa. Soil—sandy loam. Area originally cultivated. Altitude 750 ft. Aspect—N. E. Trees 7 years old transplanted in 1915, spaced 5' x 5'.
Average Heights at End of Year's Growth (feet).				
2	....	....	....	.7
3	.3	....	....	.8
4	.3	....	....	.9
5	.3	1.3	1.1	1.3
6	.4	1.7	1.3	2.0
7	.7	2.0	1.7	3.0
8	1.0	2.4	2.2	3.2
9	1.3	2.9	2.9	3.7*
10	2.6	3.7	3.9	....
11	....	....	4.9	....
12	....	....	5.9†	....

†See Fig. 30.

*See Fig. 29.

TABLE NO. 8. HEIGHT GROWTH OF WHITE ASH, BLACK WALNUT, AND BLACK CHERRY IN PLANTATIONS.

Age of Trees from Seed (Years).	Description of the Plantations.			
	White Ash (<i>Fraxinus americana</i>).		Black Walnut (<i>Juglans nigra</i>).	Black Cherry (<i>Prunus serotina</i>).
	Stone State Forest. Soil—heavy sandy loam. Area originally cultivated. Altitude 1,140 ft. Aspect—Eastern. 2 yr. seedlings planted in 1909, spaced 5' x 5'.	Mont Alto State Forest. Soil—sandy loam. Area originally cultivated. Altitude 1,000 ft. Aspect—Eastern. 1 yr. seedlings planted in 1905, spaced 4' x 4'.	Mont Alto State Forest. Soil—sandy loam. Area originally cultivated. Altitude 950 ft. Aspect—Eastern. 1 yr. seedlings planted in 1907, spaced 5' x 5'.	Stone State Forest. Soil—dry shallow sandy loam. Area covered with brush and sod. Altitude—1,140 ft. Aspect—Western. 1 yr. seedlings planted in 1910, spaced 4' x 4'.
Average Heights at End of Year's Growth (feet).				
1	....	.3	.3	....
2	....	.5	.6	.3
3	.9	.8	.8	.4
4	1.9	1.1	1.2	.5
5	2.9	1.4	1.8	.6
6	4.4	2.0	2.7	.7
7	5.8	2.8	3.5	.9
8	7.9	3.8	4.0	1.6
9	10.4	4.6	4.5	....
10	13.9*	6.1	4.8	....
11	....	7.0	....	....
12	....	7.7	....	....
13	....	8.2	....	....

*Average diameter, 4½ ft. above ground, was, in 1916, 1.5 inches.

FIG. 17. WHITE PINE PLANTED IN BRACKEN AND SWEET FERN.
Three year old stock was used and four years later the trees were just overtopping weeds and brush. Clear-field State Forest.FIG. 18. PLANTATION OF BLACK WALNUT.
Trees ten years old from seed. The plantation was made in 1908, using 1 year stock. Mont Alto State Forest.

TABLE NO. 7. HEIGHT GROWTH OF NORWAY SPRUCE AND DOUGLASS FIR IN PLANTATIONS.

Age of Trees from Seed (Years).	Description of the Plantations.			
	Norway Spruce (<i>Picea Abies</i>).			Douglas Fir (<i>Pseudotsuga taxifolia</i>).
	Austin State Forest. Soil—red shale. Site originally farmed. Cultivated. Altitude 1,300 ft. Aspect—S. E. 3 yr. seedlings planted in 1910, spaced 4'x 4'.	Stone State Forest. Soil—sandy loam. Brush land. Altitude 1,130 ft. Aspect — North-ern. 3 yr. seedlings planted in 1910, spaced 5'x 5'.	Jacob Nolde Estate, Reading, Pa. Soil—sandy loam. Brush land, cleared before plant-ing. Altitude 700 ft. Aspect—Eastern. 4 yr. trans-plants planted in 1909, spaced 3½'x 4'.	Jacob Nolde Estate, Reading, Pa. Soil—sandy loam. Area originally cultivated. Altitude 750 ft. Aspect—N. E. Trees 7 years old transplanted in 1915, spaced 5'x 5'.
Average Heights at End of Year's Growth (feet).				
2	....	....	....	.7
3	.3	....	....	.8
4	.3	....	....	.9
5	.3	1.3	1.1	1.3
6	.4	1.7	1.3	2.0
7	.7	2.0	1.7	3.0
8	1.0	2.4	2.2	3.2
9	1.3	2.9	2.9	3.7*
10	2.6	3.7	3.9	....
11	....	....	4.9	....
12	....	....	5.9†	....

†See Fig. 30.

*See Fig. 29.

TABLE NO. 8. HEIGHT GROWTH OF WHITE ASH, BLACK WALNUT, AND BLACK CHERRY IN PLANTATIONS.

Age of Trees from Seed (Years).	Description of the Plantations.			
	White Ash (<i>Fraxinus americana</i>).		Black Walnut (<i>Juglans nigra</i>).	Black Cherry (<i>Prunus serotina</i>).
	Stone State Forest. Soil—heavy sandy loam. Area originally cultivated. Altitude 1,140 ft. Aspect—Eastern. 2 yr. seedlings planted in 1909, spaced 5'x 5'.	Mont Alto State Forest. Soil—sandy loam. Area originally cultivated. Altitude 1,000 ft. Aspect—Eastern. 1 yr. seedlings planted in 1906, spaced 4'x 4'.	Mont Alto State Forest. Soil—sandy loam. Area originally cultivated. Altitude 950 ft. Aspect—Eastern. 1 yr. seedlings planted in 1907, spaced 5'x 5'.	Stone State Forest. Soil—dry shallow sandy loam. Area covered with brush and sod. Altitude—1,140 ft. Aspect—Western. 1 yr. seedlings planted in 1910, spaced 4'x 4'.
Average Heights at End of Year's Growth (feet).				
1	....	.3	.3	....
2	....	.5	.6	.3
3	.9	.8	.8	.4
4	1.9	1.1	1.2	.5
5	2.9	1.4	1.8	.6
6	4.4	2.0	2.7	.7
7	5.8	2.8	3.5	.9
8	7.9	3.8	4.0	1.6
9	10.4	4.6	4.5	....
10	13.9*	6.1	4.8	....
11	....	7.0	....	....
12	....	7.7	....	....
13	....	8.2	....	....

*Average diameter, 4½ ft. above ground, was, in 1916, 1.5 inches.

Fig. 17. WHITE PINE PLANTED IN BRACKEN AND SWEET FERN.
Three year old stock was used and four years later the trees were just overtopping weeds and brush. Clear-field State Forest.Fig. 18. PLANTATION OF BLACK WALNUT.
Trees ten years old from seed. The plantation was made in 1908, using 1 year stock. Mont Alto State Forest.

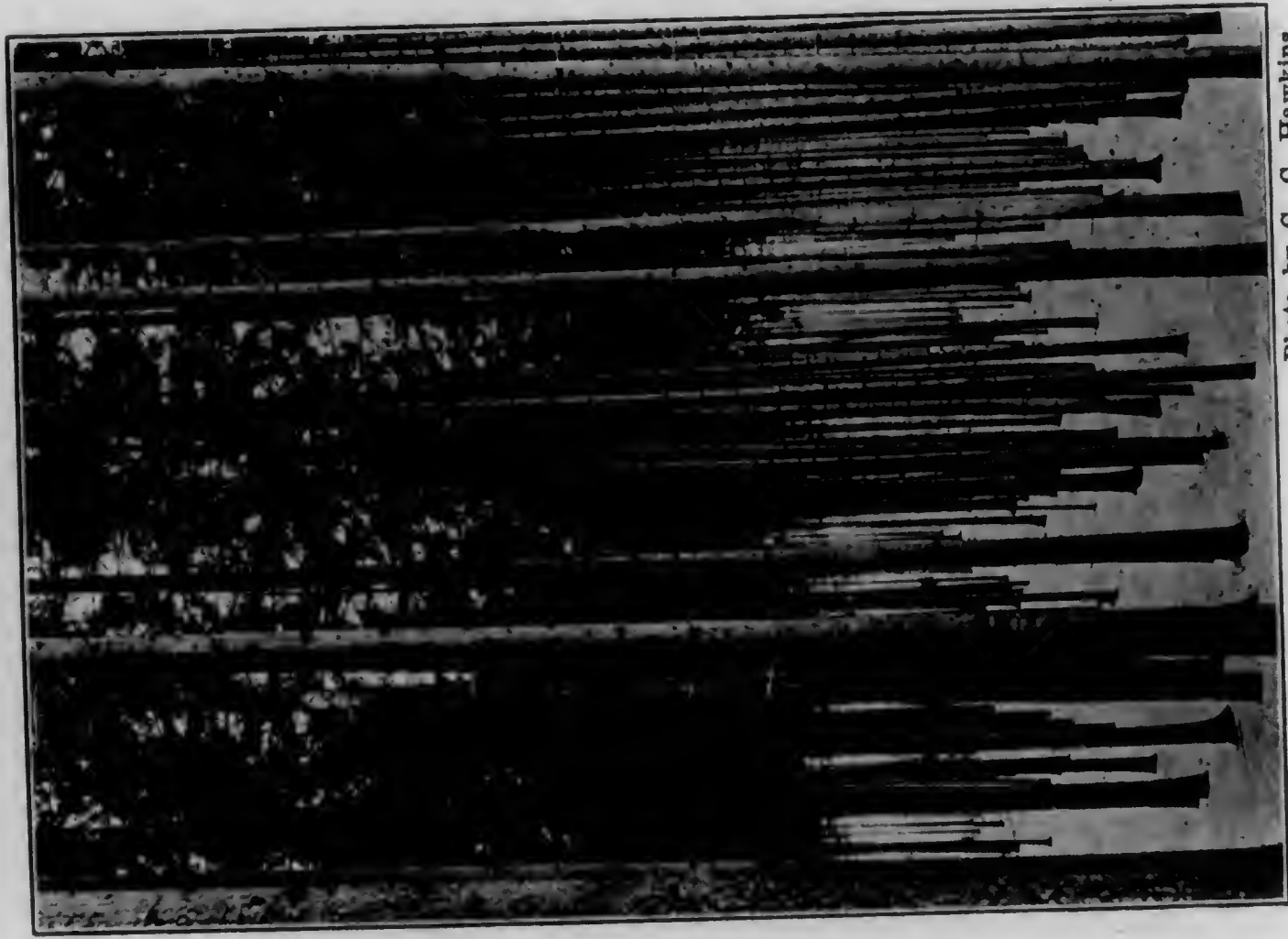


Photo by G. O. Hawkins.

Fig. 19. A NORWAY SPRUCE PLANTATION IN GERMANY.



Fig. 20. EUROPEAN LARCH IN PENNSYLVANIA.

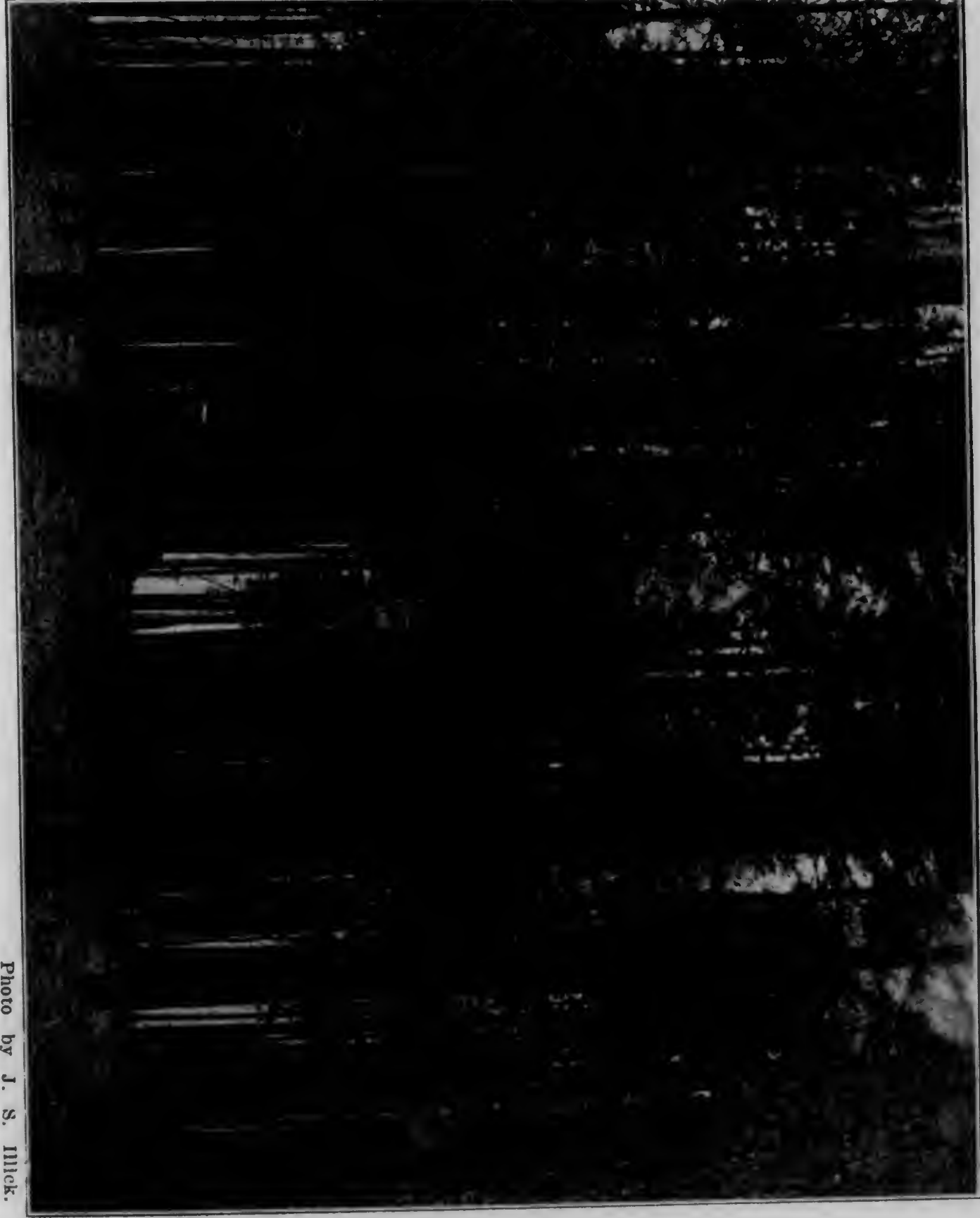


Photo by J. S. Muck.

Fig. 21. WHITE PINE PLANTATION.

Two year old seedlings were used. The trees are 58 years old.

WHITE PINE PLANTATION MADE IN 1902. MONAGHAN FIELD, MONT
ALTO STATE FOREST.



Photo by F. X. Drachbar.

Fig. 22. This picture was taken two years after planting, the trees being four years old from seed. Average height was seven inches.



Photo by Dr. J. T. Rothrock.

Fig. 23. This picture shows the plantation six years after planting. The trees were eight years old. Average height four feet.

WHITE PINE PLANTATION. MONAGHAN FIELD, MONT ALTO STATE
FOREST.



Photo by Geo. H. Wirt.

Fig. 24. When this picture was taken the trees had been planted nine years and were eleven years old. Average height 7.6 feet.



Photo by J. S. Illiek.

Fig. 25. This picture was taken in the fall of 1916 when the trees were seventeen years old. The average height of the trees was 14.9 feet and the average diameter, $4\frac{1}{2}$ feet above ground, was 2.4 inches.



Photo by J. E. McNeal.

Fig. 26. PLANTATION OF SCOTCH PINE.

Trees nine years old from seed. Average height nine feet. Average diameter 1.2 inches. Jacob Nolde Estate, Berks County, Pennsylvania.



Photo by J. E. McNeal.

Fig. 27. PLANTATION OF JACK PINE.

Trees nine years old. Average height 10.4 feet. Average diameter 1.3 inches. Jacob Nolde Estate, Berks County, Pennsylvania.



Photo by J. E. McNeal.

Fig. 28. PLANTATION OF BULL PINE.
Trees eight years old. Average height 5.7 feet. Jacob Nolde Estate, Berks
County, Pennsylvania.



Photo by J. E. McNeal.

Fig. 29. PLANTATION OF DOUGLAS FIR.
Trees nine years old. Average height 3.7 feet. Jacob Nolde Estate, Berks County,
Pennsylvania.

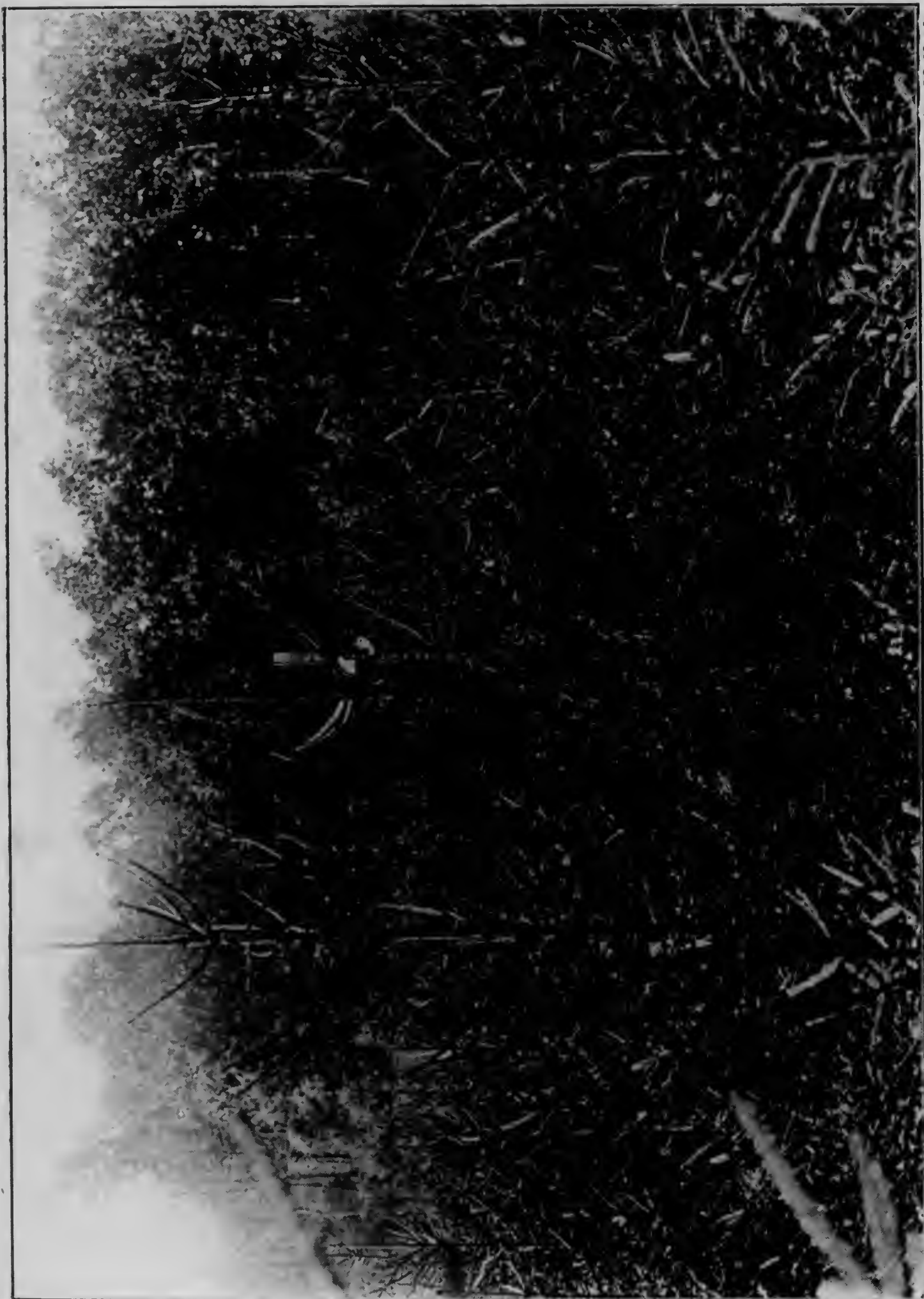


Photo by J. E. McNeal.

Fig. 30. PLANTATION OF NORWAY SPRUCE.
Trees eleven years old. Average height 5.9 feet. Jacob Nolde Estate, Berks County, Pennsylvania.

PROTECTION OF THE PLANTATION.

The success or failure of the plantation is directly dependent on various external dangers which may injure the trees or destroy them entirely, either as a whole, or in part. Among the factors of danger most to be guarded against are:

- Fire—First and foremost.
- Grazing.
- Gnawing animals.
- Insects.
- Fungi.

FIRE.—No reforestation project should be undertaken unless the planting site be so protected that danger of fire is minimized. One fire running over the surface of the ground, feeding on leaf litter and other inflammable debris, means almost certain destruction of the planted trees. The absolute necessity of providing an adequate system of protection from fire cannot be too strongly brought to the attention of the planter. Space here does not warrant going into details of protective measures. They are too voluminous, and, too, each site has its own particular protective necessities. Such information may be obtained by addressing the Bureau of Forest Protection, Department of Forestry, Harrisburg, Pa.

GRAZING.—Grazing of cattle over land planted to forest trees should not be permitted, at least not until the trees have reached a height of fifteen to twenty feet. In young plantations, cattle may either eat or trample down the small trees, resulting in the destruction of all or part of the plantation.

GNAWING ANIMALS.—Hardwood plantations in this State have occasionally been damaged by rabbits and mice gnawing the bark and frequently girdling the small tree. Such damages are usually prevalent during severe winters when snow makes other food difficult of access. In coniferous plantations little damage has been reported from this cause.

INSECTS.—Numerous insects do more or less damage in plantations of all species, both young and old, some attacking the foliage, while others work in the bark or wood of the stems. The work of certain insects results in death to the tree while others do only temporary injury. Special attention is called to the destructive ravages of the white pine weevil (*Pissodes strobi*) which has been the greatest source of insect damage in white pine plantations in Pennsylvania. This insect works particularly on young white pines, although its activities are not confined to them alone. It is quite common on old trees and has been found in several State forest plantations of Scotch pine and to a more limited extent on Norway spruce.

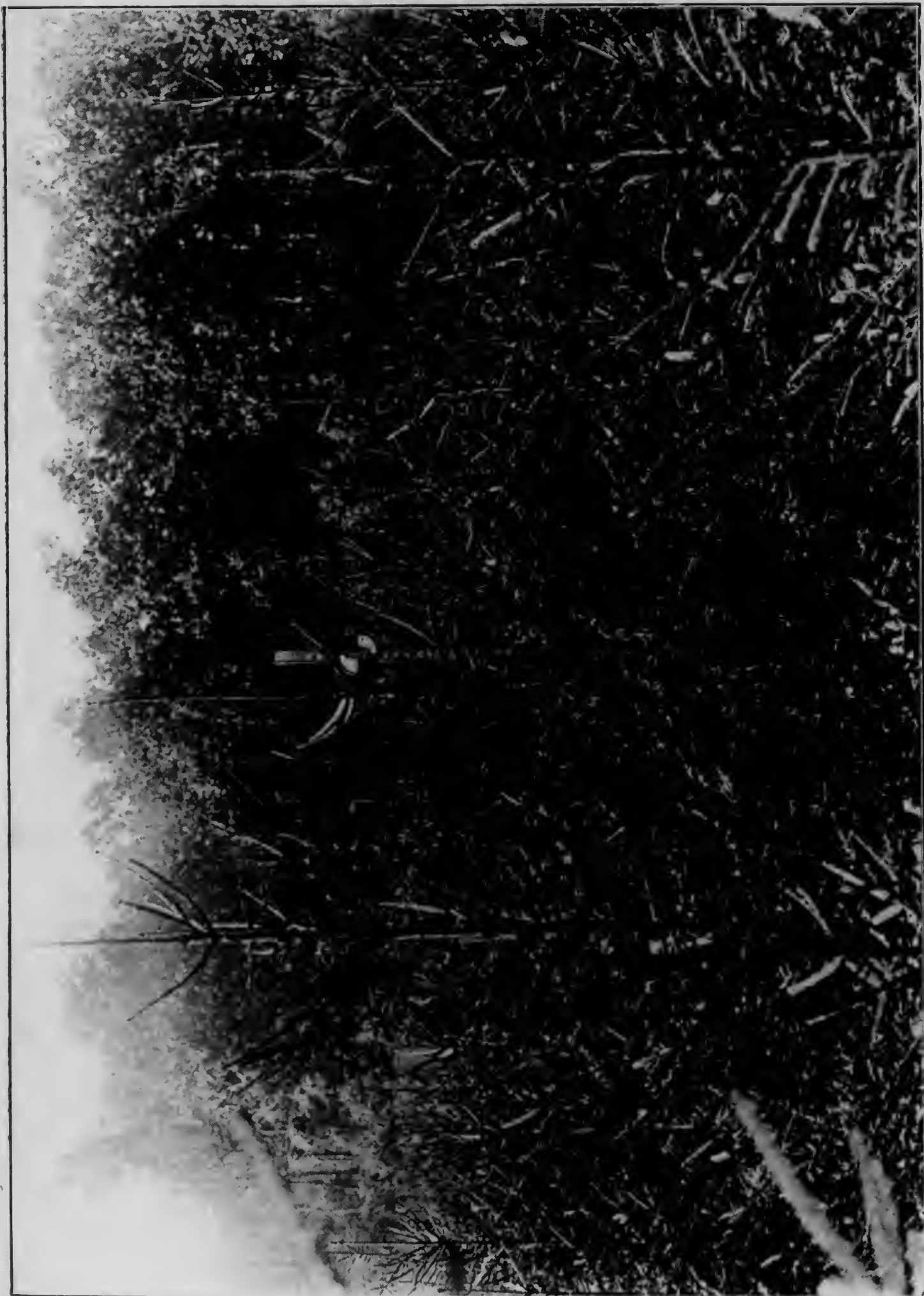


Photo by J. E. McNeal.

Fig. 30. PLANTATION OF NORWAY SPRUCE.
Trees eleven years old. Average height 5.9 feet. Jacob Nolde Estate, Berks County, Pennsylvania.

PROTECTION OF THE PLANTATION.

The success or failure of the plantation is directly dependent on various external dangers which may injure the trees or destroy them entirely, either as a whole, or in part. Among the factors of danger most to be guarded against are:

- Fire—First and foremost.
- Grazing.
- Gnawing animals.
- Insects.
- Fungi.

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The adult beetle is about $\frac{1}{4}$ inch in length, of a reddish brown color, and somewhat mottled with white. The female beetle deposits her eggs in the bark, usually of the terminal shoots, in the spring. The eggs develop into grubs during the month of June. The grubs eat their way obliquely toward the center of the shoot and downward into the pith for a half inch or so. A great many eggs are usually deposited in each shoot and the numerous grubs resulting completely destroy the shoot. Frequently they destroy lateral branches also and sometimes are found in preceding years' growths.

Trees attacked by the weevil cannot easily be detected until after the first few weeks in July, when the shoots begin to wilt and turn brown. Examination of the shoots, by making longitudinal cuts in the shoot, will reveal the plump white grub. White pine and Scotch pine plantations, particularly, should be carefully searched for signs of the weevil about the middle of July and August. All shoots turning, or turned brown, should be cut close to the last whorl of branches and burned. Grubs and partly matured beetles in the shoots are thereby destroyed and their spread checked. Many birds are natural enemies of insects, destroying great numbers of them. Protect the birds and they will help protect the trees.

FUNGI.—Various fungous diseases are found on certain species of trees which it has been suggested to plant. Some do only temporary damage while others cause speedy death to the attacked tree. No attempt will be made to enter into a discussion of the many possible fungous diseases. However, attention of all persons interested in the planting of white pine is called to the white pine blister rust, a fungus which has been brought from Europe on imported nursery stock. Its spread in this country endangers our white pine, and it has been reported in several parts of Pennsylvania but only as isolated infections. A close watch should be kept for this disease to prevent its spread.

This fungus has two hosts, the five needled pines and wild and cultivated currants and gooseberries, upon which it completes its life cycle. On pines, its appearance may be detected by the presence of irregular swellings of the bark. In the spring, from the latter part of April to the middle of June, fruiting bodies appear on these swellings. Whitish blisters, about $\frac{1}{8}$ to $\frac{1}{4}$ of an inch across, first appear, which change to orange color in a few days. By the middle of June, the orange colored postules, which are spores, each one capable of producing the disease, disappear, leaving small rounded hollows on the infected part of the tree. These spores do not infect pines, but attack leaves of currants and gooseberries. Young pines attacked by the blister rust are almost invariably killed, either the first or second year. Old trees may have branches only infected, but usually the infection spreads, finally killing the tree.

The spread of this fungus is impossible unless there are currants and gooseberries upon which it can pass a part of its life cycle. Therefore to check its spread, all currants and gooseberries in the vicinity of the plantation of white pines should be destroyed.

A very complete description of the white pine blister rust is given in Farmers' Bulletin No. 742, U. S. Department of Agriculture. If the presence of the disease is suspected in any part of Pennsylvania, notify the Commissioner of Forestry, Harrisburg, Pa.

All persons interested in reforestation in Pennsylvania who find destructive agencies, such as insects or fungous diseases, working in trees, are requested to bring the matter to the attention of the Commissioner of Forestry. A description of the character and extent of the damage being done should be given. Where possible, a specimen of the infected part of the tree should accompany this information.

PART II.

WHERE AND HOW TO OBTAIN PLANTING STOCK.

Small trees for forest planting may be obtained from the Pennsylvania Department of Forestry. Five large nurseries for the production of forest tree seedlings and transplants are maintained by the Department. In addition, twenty of the State Forests have small nurseries. Trees from these nurseries, over and above what is needed for State forest planting, are furnished to individuals free of charge for private planting in Pennsylvania. This is provided for by an Act of the legislature approved April 21, 1915, as follows:

AN ACT

Authorizing the Department of Forestry to grow and distribute young forest trees, and restricting their use after distribution.

Section I. Be it enacted, &c., That the Department of Forestry is hereby authorized to grow young forest trees, and to distribute them to those desiring to plant them, in such quantity and under such regulations as may be prescribed by the Department, when the available stock in the forest nurseries shall be in excess of that required by the Department for forest planting. No charge shall be made for the trees so distributed, but the cost of boxing and shipping shall be paid by the applicant. The applicant must enter into an agreement with the Department to plant the young trees under such conditions or regulations as may be made by the Department,

and to protect and care for them when planted. The Department may render such assistance and instruction in the planting of the trees as it may deem necessary to secure their proper planting.

Section 2. That all such young forest trees, which shall be distributed as aforesaid, shall not be subject to sale in the hands of the applicant, but shall be properly planted, in accordance with the agreement entered into with the Department.

Section 3. That all acts and parts of acts inconsistent with or supplied by this act are repealed.

Approved—The 21st day of April, A. D. 1915.

MARTIN G. BRUMBAUGH.

The annual production from State owned nurseries is 6,000,000 to 8,000,000 seedlings and transplants. In 1916, a total of 6,946,295 were removed from State nurseries, of which 1,454,275 were given to individuals in the State.

The stock grown in these nurseries is not suitable for purely ornamental planting, and applications for trees for this purpose will not be granted. They are grown for, and are to be used only for afforestation, and this only within the State.

HOW TO OBTAIN PLANTING STOCK.

Forest tree seedlings and transplants can be furnished from any one of the State owned nurseries.

Persons who own waste land in Pennsylvania and who desire to reforest it, should report to the Department of Forestry at Harrisburg, or to the nearest State Forester named below.

James E. McNeal, District Forester, No. 616 Washington St., Reading, Berks county. Mr. McNeal's district includes Berks, southern Carbon, Lehigh, Northampton, and Schuylkill counties.

R. Lynn Emerick, District Forester, Coudersport, Potter county. Mr. Emerick's district includes Potter and McKean counties.

Walter D. Ludwig, District Forester, care of Chamber of Commerce, Johnstown, Cambria county. Mr. Ludwig's territory includes Cambria, Blair, and Indiana counties.

Wm. F. Dague, District Forester, Clearfield, Clearfield county. Mr. Dague has charge of Clearfield county interests.

John L. Strobeck, District Forester, Analomink R. F. D., Monroe county. Mr. Strobeck's territory includes Monroe, northern Carbon, and parts of Lackawanna and Wayne counties.

John E. Avery, Notch, Pike county.

L. G. Barnes, Box 33, Centre Hall, Centre county.

W. J. Bartschat, Troxelville, Snyder county.

Chas. E. Baer, Elimsport, Lycoming county.

John A. Bastian, Loyalsock, Lycoming county.

V. M. Bearer, Ligonier, Westmoreland county.

CLEARFIELD STATE FOREST NURSERY.



Fig. 31. These beds contain thousands of seedlings. European larch, two years old.



Fig. 32. Pitch pine, two years old. To be removed from the beds in the spring and planted in their final location.

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CLEARFIELD STATE FOREST NURSERY.



Fig. 31. These beds contain thousands of seedlings. European larch, two years old.



Fig. 32. Pitch pine, two years old. To be removed from the beds in the spring and planted in their final location.

Tom O. Bietsch, McAlevysfort R. F. D. No. 1, Huntingdon county.
 Joe R. Blouse, Glen Union, Clinton county.
 A. W. Bodine, Mount Union R. F. D., Huntingdon county.
 H. E. Bryner, New Germantown, Perry county.
 Wm. L. Byers, Rainsburg, Bedford county.
 Robert G. Conklin, Fayetteville, Franklin county.
 H. F. Critchley, North Bend, Clinton county.
 F. H. Dutlinger, Westport, Clinton county.
 Harry E. Elliott, Sinnamahoning, Cameron county.
 W. B. Evans, Sizerville, Cameron county.
 P. Hartman Fox, Austin, Potter county.
 Thos. H. Golden, Crossfork, Potter county.
 Thos. C. Harbeson, Lloyd, Tioga county.
 J. R. Hogentogler, Loganton R. F. D. No. 2, Clinton county.
 W. H. Horning, Karthaus, Clearfield county.
 J. S. Illick, Mont Alto, Franklin county.
 John W. Keller, Boalsburg, Centre county.
 Carl L. Kirk, Penfield, Clearfield county.
 Chas. R. Meek, Coburn, Centre county.
 Homer S. Metzger, Loganton R. F. D. No. 1, Clinton county.
 W. E. Montgomery, Spring Mills R. F. D. No. 1, Centre county.
 Howard H. Morgan, Slate Run, Lycoming county.
 T. Roy Morton, Petersburg, Huntingdon county.
 Marvin H. Moyer, Slate Run, Lycoming county.
 Paul H. Mulford, Asaph, Tioga county.
 Max E. Müller, Hammersleyfork, Clinton county.
 Robert R. Neefe, Waterville, Lycoming county.
 Geo. S. Perry, Aitch, Huntingdon county.
 Geo. A. Retan, Mont Alto, Franklin county.
 Alfred E. Rupp, Fort Loudon, Franklin county.
 J. B. Ryon, Sinnamahoning, Cameron county.
 Geo. W. Sheeler, Snow Shoe, Centre county.
 A. C. Silvius, Laurelton, Union county.
 H. A. Smith, East Waterford, Juniata county.
 Robert W. Stadden, Greentown, Pike county.
 Lewis E. Staley, Mont Alto, Franklin county.
 H. C. Van Horn, Conrad, Potter county.
 D. Kerr Warfield, Milroy, Mifflin county.
 A. B. Wells, Fields Station, Lycoming county.
 John R. Williams, Pine Grove Furnace, Cumberland county.
 Raymond B. Winter, Mifflinburg, R. F. D., Union county.
 Chas. E. Zerby, Medix Run, Elk county.

Blank forms for making application for seedlings and transplants will, on request, be furnished by the Department of Forestry, or by any one of the above named foresters. The application, properly

filled out, must be forwarded to the Department of Forestry, Harrisburg. Foresters and nurserymen are not invested with the right to grant free distribution of planting stock. This may be done only by the Commissioner of Forestry.

ADVICE AND EXAMINATION.

Extensive planting operations should not be undertaken by the layman without receiving advice from a competent person trained in the theory and practice of forestry. Reforesting costs money, and a mistake in judgment as to what and how to plant may mean complete failure of the plantation and a heavy loss in money and time. A trained forester cannot guarantee the success of a plantation, for failure sometimes occurs from no apparent cause, or as the result of insect and fungous attacks. However, it is indisputable that reliance on a forester's knowledge presupposes the planting of the best species for the site and, therefore, the best chance of success.

The Department of Forestry is willing to give all possible assistance to individuals in planting operations. Where it is proposed to plant up areas of considerable size, the Department will make every effort to have one of its foresters make an examination of the area to be planted, and do this free of charge. The forester will then make a report to the Department on his examination, suggest the species it is proposed to plant, and furnish a planting plan to be followed. He will also give the individual what advice he can on how best to plant, the number of men necessary to do the planting, and how to organize the crew.

Since the Department of Forestry has only a limited number of foresters available for making examinations, application for examinations and advice should be made at least three months before the planting season. In districts where there is a district forester, he should first be consulted for advice, since the matter will be referred to him.

WHAT IS REQUIRED OF THE RECIPIENT.

In return for receiving seedlings from the Department of Forestry, all persons are required to pay the cost of packing and transportation, and furnish reports requested of them. The seedlings will be shipped from one of the State nurseries. About four days previous to shipment, the nurseryman will inform the applicant of the date of shipment. On the day of shipping, he will mail two blank forms which must be filled in. One is to be used to acknowledge receipt of the nursery stock (B. of S. & M. Form 52, "Nursery Stock Receipt"). The other is for making report on the planting of the seedlings (B. of S. & M. Form 34-B, "Plantation Report for Private Planting").

NURSERY STOCK RECEIPT.—On receipt of the shipment, the packing box should be examined. Then several bundles of seedlings should be opened and the number of seedlings in the bundles counted. It will be found that the bundles contain 50, 75, or 100. Occasionally a few extra seedlings of small size are in the bundles. These should not be considered. After determining the number in each bundle, "heel in" all seedlings, counting the number of bundles as this is done. The total number of seedlings received is then known.

The blank form, "Nursery Stock Receipt", should be filled out immediately and mailed to the Commissioner of Forestry, Harrisburg. Make note thereon of the condition of the packing box and the number of seedlings received, and their condition.

NURSERY CHARGE.—The amount of the charge for packing and shipping will be supplied by the nurseryman. As a rule, the packing and hauling to point of shipment averages about 25c per thousand seedlings. Transportation by mail or express averages about 20c per thousand. If sent prepaid, this cost will be included in the amount of the charge sent by the nurseryman. This amount is to be remitted to the Commissioner of Forestry and should accompany the "Nursery Stock Receipt." Remittance may be made by postage stamps if it amounts to less than 50c. If the charge is 50c or over, remittance should be made by check or postal money order.

PLANTATION REPORT FOR PRIVATE PLANTING.—Directly after the seedlings are planted, the blank form provided for this purpose is to be filled out and mailed to the Commissioner of Forestry, Harrisburg. It is imperative that no delay in planting take place and that the report be submitted promptly.

The matter of making full and complete report is important and requires careful attention. Keep account of all costs incurred, including drayage from station to planting site, hired labor, and the number of hours devoted to planting by salaried employees. Calculate what this time is worth and indicate it in the space provided on the blank.

Give a description of the plantation as called for on the form. The information conveyed by these reports will be a matter of record at the Department of Forestry. We desire complete and accurate reports.

SPECIES USUALLY AVAILABLE FOR FREE DISTRIBUTION.

All species listed under "Species to Plant" are not grown in State nurseries. The following species are usually available for free distribution.

White pine,	2 and 3 years old.
Scotch pine,	2 years old.
Pitch pine,	2 years old.
Norway spruce,	3 years old.
European larch,	2 years old.

The following species are occasionally available but in more limited numbers.

Red pine,	2 and 3 years old.
Japanese larch,	2 years old.
Bull pine,	2 years old.
Sugar maple,	1 and 2 years old.
White ash,	1 and 2 years old.
Red oak,	1 and 2 years old.
Honey locust,	1 and 2 years old.
Black cherry,	1 and 2 years old.

POINTS TO BEAR IN MIND.

1. Trees are furnished for forest planting only, not for shade or ornamental purposes.
2. They are for planting only in Pennsylvania.
3. Application should be made at least several months before the planting season, which begins about the first of April, and no application will be granted after the 31st of March.
4. Applications must be filled out in detail.
5. Notice as to whether or not the application can be granted will be given several weeks before trees are shipped.
6. Acknowledgment of receipt of nursery stock must be made promptly. For this, use Form 52, "Nursery Stock Receipt."
7. Remittance must accompany "Nursery Stock Receipt."
8. Seedlings must be planted without delay.
9. Make report to the Department of Forestry on the cost of the planting and the conditions under which the plantation was made. For this, use Form 34-B.
10. Be prepared to make report to the Department of Forestry on the condition of the plantation whenever requested to do so.
11. Fewer than 500 seedlings will not be furnished.



Steel observation tower on Mont Alto State Forest.

Commonwealth of Pennsylvania

DEPARTMENT OF FORESTRY

BULLETIN NO. 16.

REPORT

OF THE

Chief Forest Fire Warden

FOR

THE YEAR 1916



Issued by Direction of the Commissioner of Forestry.

HARRISBURG, PA.:
WM. STANLEY RAY, STATE PRINTER.
1917.

PENNSYLVANIA DEPARTMENT OF FORESTRY

ROBERT S. CONKLIN,
Commissioner of Forestry

IRVIN C. WILLIAMS,
Deputy Commissioner of Forestry

BUREAU OF FOREST PROTECTION

GEORGE H. WIRT,
Chief Forest Fire Warden

HOWARD W. SIGGINS,
Clerk

LETTER OF TRANSMITTAL

Hon. Robert S. Conklin,
Commissioner of Forestry.

Dear Sir:

There is presented herewith the second annual report of the Chief Forest Fire Warden, setting forth the work of the Bureau of Forest Protection for the calendar year ending December 31, 1916. Your attention is called particularly to the following features: Payment of claims for fire extinction, and claims still pending; legal actions that have been started, and those still pending; and to the fine spirit of co-operation shown throughout on the part of the wardens and citizens. This opportunity is taken to express our appreciation to those individuals, or groups of individuals, who have helped us. Education and co-operation are sure to accomplish the results we are after.

Yours respectfully,

GEORGE H. WIRT,
Chief Forest Fire Warden.

Harrisburg, January 30, 1917.

ONLY 28 FIRES ARE REPORTED AS HAVING
BURNED OVER MORE THAN 1,000 ACRES EACH,
BUT THOSE 28 BURNED OVER MORE THAN
HALF OF ALL THE LAND BURNED OVER

LARGE FIRES ARE THE RESULT OF
SMALL FIRES UNEXTINGUISHED

ANNUAL REPORT
OF THE
CHIEF FOREST FIRE WARDEN
1916

The work of the Bureau has greatly increased during the year, and if any effective scheme of forest protection is to be realized, its work for the next several years must increase. When it is considered that forest protection is the most important part of forestry and without this phase of the work, practically all other forestry work is of short duration and probably of little value, it becomes self evident that the work of this Bureau should be developed as rapidly as possible. When Pennsylvania is rid of the curse of forest fire, forestry and its beneficent results will bring renewed prosperity and not until then. "The care of the forest brings all blessings."

The work of the year is discussed in detail under the following subjects: Reorganization of forest fire wardens; meetings of forest fire wardens; badges, wage rates, co-operation, publicity, legal affairs and financial statement. A budget covering expenditures for the next two years is presented, and a number of tables relating to forest fires.

REORGANIZATION OF FOREST FIRE WARDEN SYSTEM

At the beginning of the year, six counties had no wardens, and twenty-seven counties were almost completely reorganized. The end of the year finds all the counties reorganized, except Dauphin, Lancaster, Lebanon, and Montgomery. Carbon, Lackawanna, Lehigh, Luzerne, and Schuylkill have not been entirely completed on account of the probable organization of a protective association in the southern anthracite region. 1,343 certificates of appointment have been issued, leaving only 148 wardens from the old system to be investigated and reported upon. When the reorganization is complete, there will have been between 1,500 and 1,600 men appointed. Many of the former wardens were dropped and other men have been found.

The certificates used during 1915 and 1916 were small identification cards, on the back of which was printed a statement to the effect that the appointment expired January 1, 1917. The new certificate will be a sheet of paper 8½ by 11 inches, and will read as follows:

COMMONWEALTH OF PENNSYLVANIA



DEPARTMENT OF FORESTRY

This is to Certify That

.....
 having been chosen because he is specially qualified to perform the duties about to be required of him, and having subscribed to the oath of office, is appointed a

Forest Fire Warden

in the State of Pennsylvania.

He is hereby invested with the power and authority pertaining to said office, as prescribed by law, and shall continue as a Forest Fire Warden during good behavior, or so long as the service rendered is satisfactory to the Department of Forestry.

Given under our hands and the seal of the Department of Forestry of the Commonwealth of Pennsylvania thisday of....., 19....

.....
Commissioner of Forestry.

Form 76.
 (Seal)

.....
Chief Forest Fire Warden.

It will be noted that this certificate provides for a permanent appointment. One of the things for which we must work in the forest fire warden system is permanency. Experience in the woods and in working with fire, as well as with the people of the community, is worth much to the Commonwealth. It will be our object, therefore, to choose good men for the service and then retain them as long as possible. It may not be amiss to state here that the wardens whom we now have in our organization are men who are interested in their work, honest, and capable. We do not expect to have to make many changes because of reasons other than those advanced by the wardens themselves.

The oath of office referred to in the new certificate of appointment has been approved by the Attorney General, and reads as follows:

PENNSYLVANIA DEPARTMENT OF FORESTRY

BUREAU OF FOREST PROTECTION

Form 75.

STATE OF PENNSYLVANIA }
 COUNTY OF..... } ss:

I,, do solemnly { affirm } { swear } that I will support, obey and defend the Constitution of the United States and the Constitution of this Commonwealth; that I will discharge the duties of Forest Fire Warden for the Department of Forestry of this Commonwealth with fidelity, and that I will execute the orders and directions of the Commissioner of Forestry promptly and to the best of my ability; that I will not receive directly or indirectly any money or other valuable thing for the performance or non-performance of any act or duty pertaining to my office other than the compensation allowed by the Department of Forestry; that I will keep careful and accurate records of the work performed by me in the manner specified and required by the Department of Forestry; that I will render to the Department of Forestry a true and correct account of time and cash expenditures within 60 days of such expenditures; that time so expended and expense so charged shall have been necessarily incurred in the performance of my official duties; and that upon severing my connection with the Department of Forestry I will surrender the badge, the certificate of appointment, and all other property belonging to the Department of Forestry, then in my possession.

Sworn and subscribed before me

this..... day of, 191.....

.....
Forest Fire Warden.

My Commission expires

In accordance with a ruling from the Attorney General, this oath of office together with a new form of certificate on each fire bill, will make it possible for us to do away with the affidavit which heretofore has been required on each bill. This arrangement will result in a saving to the Protection Fund of from \$1500 to \$2000 annually. It will also tend to greater promptness on the part of the wardens in forwarding their bills and reports.

FIRE DISTRICTS

Now that the local forest fire wardens have been located, it is necessary that arrangements be made as soon as possible for proper supervision. In accordance with paragraph (d), Sec. 102, of the Forest Protection Code (1915), forest fire districts have been determined upon in accordance with what we believe will be the future requirements for proper forest development and protection.

1. Erie, Crawford, Mercer, and Venango.
2. Lawrence, Butler, Beaver, Allegheny, Washington, and Greene.
3. Warren and Forest.
4. Clarion, Jefferson, Armstrong, and Indiana.
5. Westmoreland, Fayette, and Somerset.

6. McKean and Potter.
7. Elk and Cameron.
8. Clearfield and Centre.
9. Cambria, Blair, and Bedford.
10. Huntingdon, Mifflin, and Juniata.
11. Fulton, Franklin, and Adams.
12. Perry, Cumberland, and York.
13. Tioga, Bradford, and Sullivan.
14. Clinton and Lycoming.
15. Union, Snyder, Northumberland, Montour, and Columbia.
16. Susquehanna, Wyoming, and Lackawanna.
17. Monroe, Pike, and Wayne.
18. Luzerne, Carbon, and Schuylkill.
19. Berks, Lehigh, and Northampton.
20. Dauphin, Lebanon, and Lancaster.
21. Chester, Delaware, Montgomery, and Bucks.

In each of these districts there should be a district fire warden, who will have from 70 to 80 local forest fire wardens under his supervision, as well as from 5 to 10 patrolmen or tower observers, excepting districts 1 and 2. The supervision of so many men during the dangerous periods of the year, the proper investigation of fire hazards and causes of fires, the mapping of the forests of the district, the educational work to be done, and the general Department work to be looked after, will keep an active man more than busy. (See Budget, Page 80.)

MEETINGS OF FOREST FIRE WARDENS

The necessity of getting together the forest fire wardens within certain limits for their common acquaintance, co-operation, and instruction, had been recognized as a very important factor in developing efficiency. The Forest Protection Code, therefore, provided for such meetings and made it a part of the fire warden's duties to attend at least one meeting a year if so instructed.

On February 11th, the following schedule of meetings was arranged for the spring of 1916:

Schedule of Meetings for Spring of 1916.

Date.	County.	Town.	Place.	Time.
March 17	S. Centre.	Bellefonte.	Garman House.	10:00 A. M.
March 18	Monroe.	Pocono Summit.	Pocono Manor Inn.	10:00 A. M.
March 20	Tioga.	Wellsboro.	Coles House and Court House.	12:00 M.
March 23	Huntingdon.	Huntingdon.	Community House.	11:00 A. M.
March 24	Mifflin.	Lewistown.	Rod and Gun Club Rooms.	9:30 A. M.
March 25	Union.	Mifflinburg.	Buffalo Valley Inn.	10:30 A. M.
March 27	Clearfield.	Clearfield.	Leonard House and Court House.	12:30 M.
March 28	Bedford.	Bedford.	Grand Central Hotel and Court House.	12:00 M.
March 30	Clinton.	Lock Haven.	Commercial Hotel.	12:00 M.
March 30	N. Centre.	Bellefonte.	Court House.	10:00 A. M.
March 31	Elk and Cameron.	Driftwood.	Ladies Aid Hall.	10:30 A. M.
April 3	Berks.	Reading.	Berkshire Hotel and Court House.	10:00 A. M.

The reorganization of wardens was practically complete in these counties. In addition, an effort was made to arrange for two meetings in Potter county but nothing satisfactory could be determined upon. This schedule was sent to the various foresters within the above named counties for completing arrangements. As rapidly as definite information was received about the time and place of meetings, the following circular letter was mailed to each fire warden expected to be present at the place and time stated therein:

B. F. P. Circular Letter 8.

Dear Sir: The local forest fire warden "shall attend an annual meeting of fire wardens in his district when notified, or present a reasonable excuse." (Code, Art. IV, Sec. 404, e.)

A meeting for the wardens of your county has been arranged for at (time and place of meeting, town, and date).

We are very desirous of having all the wardens present and hope that you can attend. This Department will pay your necessary expenses. It is hoped that you can come and return on the same day.

Use the inclosed card to notify the forester making arrangements for your entertainment.

Make notes of anything relating to forest fire conditions or business in your township which you would like to have discussed at the meeting.

With each of these circular letters was sent a postal card addressed to the forester in charge of arrangements, for the warden to signify his intention to be present or give his excuse for absence, as follows:

shall
I shall not attend the meeting of forest fire wardens.

(If you cannot come, give your reason here.)

.....
.....
.....
.....
.....
.....

.....
Local Forest Fire Warden.

(Be sure to sign your name.)

Below is a tabulated statement of attendance at the meetings and the expenses incurred in connection with them. It will be noted that 323 wardens (including foresters and rangers) were present, out of a possible 449 on the rolls. Rangers came at their own expense. In a number of cases, it was practically impossible for the wardens to get to the meetings on account of impassible roads. Considering all conditions, there was a splendid response to our call.

Including my own expenses to all of the meetings, the average cost for each warden present was only \$1.64. It is doubtful if the same amount of good could have been done for the same amount of money in any other way, as subsequent results have shown.

Table of Results.

Date.	County.	Number of foresters on roll.	Number of foresters present.	Number of forest rangers on roll.	Number of forest rangers present.	Number of wardens on roll.	Number of wardens present.	Expenses.
1916.								
March 17	South Centre,	3	3	4	3	22	15	\$30 83
18	Monroe,	1	1	.....	.....	33	19	7 56
20	Tioga,	3	4*	.....	.....	37	27	74 64
23	Huntingdon,	3	3	5	4	46	32	64 80
24	Mifflin,	1	2*	5	5	19	14	24 57
25	Union,	2	2	5	4	14	12	13 50
27	Clearfield,	2	2	4	2	41	35	61 56
28	Bedford,	1	1	.....	.....	40	23	38 83
30	Clinton,	6	6	8	3	36	27	60 04
30	North Centre,	1	2*	.....	.....	18	17	24 70
31	Elk and Cameron,	4	4	5	5	22	16	48 08
April 3	Berks,	1	1	.....	.....	49	27	33 93
	Expenses of Chief Forest Fire Warden.	.....	.....	.....	.....	.....	.....	56 70
		28	31	42	28	377	264	\$529 74

*Attended by a forester from an adjoining county.

The following letter was sent to each forester in charge of each meeting:

Harrisburg, Pa., March 13, 1916.

Dear Sir: Inclosed is a program for the meeting of forest fire wardens of your county. As Chairman of the Committee on Arrangements, you will determine which fire warden shall be nominated for chairman of the meeting and which forester for secretary, and so arrange that the organization will take place without unnecessary loss of time. It is desired that the fire wardens be made to feel that they are taking an active part in the meeting.

You will also assign the subject "Local Attitude to Forest Fires" to the fire warden whom you consider competent to handle it well. The subject "Extinction of Forest Fires" should be given to one of the foresters. It is suggested that he follow the inclosed outline, but he may depart from it if he chooses to do so.

Suggested program:

Organization:

Chairman to be a fire warden if possible.
Secretary to be a forester.

Roll call.

Purpose of meeting (to be read).

Address by George H. Wirt, Chief Forest Fire Warden.

Local Attitude to Forest Fires (by a fire warden).

Discussion of local attitude and means to change it where necessary.

Extinction of forest fires (by a forester).

General remarks and questions.

Adjournment.

Purpose of the meeting, to be read either by the chairman or the secretary:

This meeting is called in accordance with provisions of the new Forest Protection Code passed by the last Legislature, and approved by Governor Brumbaugh.

The purposes in view are that the forest fire wardens of this county may know each other better, that they may be able to co-operate better with each other, that they may discuss questions relative to forest fire prevention and control, and that there may be a general improvement in the efficiency of the forest fire organization of our great Commonwealth.

Outline on "Extinction of Forest Fires:"

1. Detection of Fires .

Necessity for promptness.

Means available.

Towers.
Patrol.
Neighbors.

2. Notification of Fire Warden.

By neighbor.
By messenger.
By telephone.

3. Local Organization for Extinction.

Fire warden and helpers, each knowing just what his work is.

Advantages of such an organization.

Saving in time.

Team work.

Efficient men—few needed.

4. Speed in Getting to Fire.

Everything thus far lost if speed is not made here.

Catch a fire while small.

Do not delay for anything.

5. Attack.

Size up fire—use brains—know local conditions.

Ten minutes thinking may save hours of work.

Stop header first and then take side lines.

6. Equipment.

Tools now used.

Best tools and what is needed.

Reasons for not supplying tools by State at present.

Crew bring own.

7. Care of Crew.

Little to be considered when promptness is the key note.

Food and water to be provided when crew is out over 8 hours.

Every means will be used to care for men.

8. Making Report and Bills.

Have it understood that men must come to warden at time of fire and report name and time spent.

Other details as issued by instructions.

In each case the remarks of the Chief Forest Fire Warden were intended to bring out the following facts:

1st. That under the reorganization each fire warden should realize that he has been chosen for an important work because of his qualifications to do that work.

2nd. That each man is a unit in a county group and each county group a company in an organization aggregating 1,500 to 2,000 men within the State.

3rd. That it is necessary for each one to be interested in the work and always ready at a minute's notice to do his part in order to co-operate with every other warden. Forest fire wardens may consider themselves as "Minute Men" in the suppression of a force which is robbing the Commonwealth of millions of acres of land.

4th. That the prevention and suppression of fires is an important work to the Commonwealth and a "man's job" into which any good citizen may throw himself and his resources because of his own interests and because of the service he may do his fellows and those who come after. From twenty to fifty million dollars is the annual loss on account of forest fires in Pennsylvania.

5th. That the prevention of forest fires is more important than mere extinction, and this must be made public sentiment.

6th. That the chief causes of fires are ignorance, carelessness, and indifference, and that the best means of prevention is education.

7th. That each fire warden, if interested, will be informed upon the subject of forest fires. He will talk about the necessity for their prevention to all his neighbors and warn every one with whom he comes in contact to be careful with fire in the woods.

8th. That each fire warden will let his neighbors know that he is a fire warden, and endeavor to get the best of co-operation from them and from every force possible.

Other points were touched upon in various meetings and many questions were answered.

FIRE WARDENS' MEETING FOR SOUTHERN CENTRE COUNTY

Held in Parlor of Garman House, Bellefonte, March 17th. *Chairman, C. H. Gramley; Secretary, W. E. Montgomery.*

The meeting was called shortly after ten o'clock. After the reading of the purpose of the meeting, the roll was called and it was found that only eight wardens were absent. All but one had a reasonable excuse, and since then, he has been dismissed for inefficiency. One of our wardens, who is a sawmill owner, was present, notwithstanding the fact that the day before he had lost a finger in his mill.

After the address of the Chief Warden, questions were asked and answered.

One warden suggested the offering of prizes for reporting fires to a warden.

Hon. J. Linn Harris, then member of the State Forestry Reservation Commission, was present for a few minutes and welcomed the wardens to Bellefonte, expressed his interest in fire prevention, his gratification at the holding of such meetings, and the hope that the meetings may become annual affairs.

The fact was brought out that the Bellefonte Central Railroad had been the cause of many fires in "the barrens" and that they had now promised to burn protective strips along their right of way. From an area which had been burned over, and for which the railroad company did not want to pay damage, it was reported that on the average \$300 was being paid in wages for the harvesting and marketing of the injured material standing on an acre. In addition to this, the owner was making a fair profit. *This is a good example of the general ignorance with respect to the value of young forest growth and to the damage that may be done by forest fires.*

Forester Leonard G. Barnes read the following paper:

Extinction of Forest Fires

Mr. Chairman, Gentlemen: We are called together today to discuss the forest fire problem in Pennsylvania, with particular reference to the problem as found in Centre county. The paper I have to present to you deals with the extinction of forest fires and aims to point out methods of combating them successfully.

In forestry, there are three classes of fires recognized: the surface fire, the ground fire, and the crown fire. In Pennsylvania we are mainly concerned with the surface fire, and to that end the subject matter of this paper is directed.

In the extinction of a forest fire, there are five steps: First, the prompt detection and location of the fire; second, immediate notification of the fire to the proper official; third, the organization of a fire fighting crew; fourth, the attack upon the fire; and fifth, the making up of reports and bills.

In the detection of a fire, too much stress cannot be laid upon the necessity of promptness. Quick detection means a small fire with little or no damage resulting. Fire observation towers, patrol, and the people living in or near the forest, are the means depended upon for the discovery of fires. On State Forests, fire towers and patrol are used. Owing to the lack of appropriation, the detection of fires in wooded areas other than State Forests must depend largely upon the people.

Fire towers are structures erected upon places of high elevation, giving view to a large scope of country. They are located so that one tower may be seen from another. In this manner forest fires are discovered by a system of triangulation. Towers have men assigned to them during dangerous seasons. They will have telephone connections with foresters, forest rangers, and fire wardens. The observer, having a view of thousands of acres, will be enabled to spot a fire as soon as it occurs, definitely locate it, and notify the nearest fire official.

The patrol system is used mostly in level or flat country. This system serves a threefold purpose. It prevents fires, detects them immediately after they start, and extinguishes them while they are small. In sparsely settled regions, without the patrol system or lookout towers, a fire may burn for hours before it is discovered. The patrolman is generally assigned during exceedingly dry seasons to a certain area and charged with the duty of keeping fires out of his district. He is required to patrol this area regularly and may cover it one or more times a day. He should be familiar with the country, knowing all the roads, trails, streams, and other topographic features. His patrol is arranged that he will be in telephonic communication with the outside so as to be able to summon help, if needed. It is hoped that money will soon be available for the patrol of wooded areas other than State Forests because they are the ones that need it.

The detection of fires in areas not State Forests must for the present time, depend upon the people living in their vicinity. It is the duty of each fire warden, therefore, to create a sentiment among the people of his range to be constantly

on the lookout for fires and to report them promptly. This can be accomplished by talking personally to the people, by circular letters, by telephone, and by the posting of fire notices in conspicuous places.

The notification of a fire warden must be immediate. Promptness is just as essential here as it is throughout the whole system. All the large fires result from letting time elapse between the start of the fire and the notification of the proper official. In a number of cases, as long as a fire is a mile or so from a person's property and he is not threatened, he will remain quietly at home and let the other fellow do the reporting and the putting out. It is such an attitude that we must overcome if forest fires are to be stopped. The fire warden should, as a duty to the State and the public, endeavor to break up this indifference wherever it exists. Let the people know you are a fire warden. Let them know what your duties are, and instill into them the necessity for immediate notification of a fire.

Notification may be made by means of the telephone or by messenger. The telephone is the better. It saves time. Where a telephone is not available, then messenger service should be used. It is not enough to know that a fire is burning on Nittany Mountain. Find out definitely from the informer the exact location of the fire, the best means of getting there, and the size of the fire. This will enable you to judge how many men you will need.

The third step in extinguishing forest fires is the organization of a fire fighting crew. Fire wardens should build up and maintain an efficient and effective co-operative fire crew. It should be a permanent crew, one that is dependable and always ready. Such an organization cannot be built up in a day or a week. It will take time. Now is the time to start it. The men should be made to feel that they are doing a patriotic service to the State. Holding a position in the crew should be regarded a mark of honor, trust, and faithfulness. Talk to the men in your community, using the information supplied by the Department of Forestry, and it should not be hard to organize a permanent fire fighting force. In selecting the men for the position, take only the efficient, the strong, and the active. Experienced men are preferable. It would be well in making up your crew to select those having telephones so that they can be assembled quickly. It is important that it be definitely understood that the fire warden is boss at all times. He issues the orders and expects them to be carried out. Members of the crew can give suggestions but not orders. Efficient work cannot be accomplished where every one is boss. The size of the crew need not necessarily be large. The day of the big fire is rapidly becoming a thing of the past. A small crew well organized is more effective than a large one loosely held together. Assign each man to a definite place on the crew and have him know just what his work is and what he is to do. Divide the crew into axemen, rakers, torchmen, and guards. If possible, have a central meeting place to which the men, upon notification of a fire, will go and from that place proceed in a body to the fire. The advantage of such an organization is self evident. Fewer men are needed, time is saved, efficient work is accomplished, and the fire is under control in a shorter time with less work and least cost. Until you build up your local fire organization, you will have to depend upon the old method of getting men wherever and however you can.

In getting to a fire, choose the quickest route. By this is not meant the hiring of transportation. Always walk to a fire if possible. Keep the fire bill as low as you can and yet give efficient service. If it becomes necessary to hire transportation, do so. Speed in getting to a fire counts 90 per cent. of the battle. The keynote of successful fire protection is prevention of forest fires and the prevention of large fires. A ten minutes' early start to a fire may mean hours of extra work saved and a small amount of damage done. The time to attack a fire is while it is small. As soon as a fire is reported, collect your crew and start. In the absence of a permanent fire fighting force, pick up men wherever you can. Insist upon the men going, but accept a reasonable excuse. The penalty for refusal of men to fight fire is a fine of \$100, or one month's imprisonment, or both. Handle this matter carefully. A too officious manner may do more harm than good.

When the crew arrives at the fire, the warden will then give his orders as to how it is to be attacked. He must use his own judgment as to the best method of fighting it. To do this intelligently, he must know his district, the location of old roads, trails, and streams along which a line of defence might be made. He should know the general character of the country, direction and force of the wind, the probable size of the fire, and the location of the header. The head of the fire is that part which is advancing most rapidly. Knowing these things, a definite plan of attack can be worked out. Haphazard fire fighting is of no avail. Knowing what to do, how to do it, and why, saves time, labor, and money.

A forest fire starts as a small circle and gradually spreads out in all directions. If there is a wind, which is generally the case, it burns faster on the leeward side, assuming an oval shape and finally developing a distinct front or head. The size and shape of the head depends upon the topography of the country, the nature of the ground cover, and the force of the wind. In many cases, a fire may develop two or more heads and the windward side of the fire die out. In planning the attack, it is well to know that a fire travels rapidly up hill, due to the heated air currents forming a draft. After passing the crest of the hill, it travels slowly

downward. The stronger the wind, the greater the speed of the fire. Fire also travels faster on a clear day than on a cloudy or damp day. The severity of the fire depends upon the condition of the floor cover. If it is just an accumulation of leaves, the fire will not be so hot nor travel so rapidly as it will in an old slashing.

On level ground or a slightly rolling country, the fire may be whipped out. This is accomplished by taking branches of pines and forming a broom. The whipping should be an underhand stroke towards the fire. Never raise the whip above the head and strike downward upon the fire. To do so will raise bunches of burning material on the next stroke and scatter them behind in unburned area, thus starting a new blaze.

A slow fire on level ground, or one that is burning downhill, may also be extinguished by cutting a fire line 2 to 3 feet wide a short distance in front of the fire and raking this line clear of leaves and debris down to the mineral soil. The material in the path should be raked away from the fire. Upon reaching this cleared line, the fire will go out from lack of fuel upon which to feed. It is necessary to keep men behind to watch that the fire, upon reaching this line, does not jump across. If it should cross, concentrate your men at this spot to stamp it out, otherwise the whole line will be lost and the work of no avail. Such a method of attack will call for the crew to be divided as follows: axemen to cut the line clear of young growth, rakers to rake the line clear of leaves down to mineral soil, guards to remain behind to prevent the fire from crossing. The warden should at all times know the progress of the work.

If the wind is high and the fire is burning rapidly up hill, it will be necessary to vary the form of attack and resort to back firing. Back firing is the setting of a fire in front of the main fire to burn towards it, against the wind, so that when the two fires meet, both must go out for lack of fuel. The use of the back fire should be understood and must not be allowed unless ordered by the warden. Back fires indiscriminately set result in needless damage and often endanger the lives of the men by their being caught between the back fire and the main fire. One of the most common mistakes in back firing is to overestimate or underestimate the rapidity of the main fire and not place the line in the proper place, thus burning over more ground than needed, or else losing the line entirely. Make your fire line far enough in advance of the main fire so that the heat of the two, when they come together, will not be so great as to drive away the guards. It should be placed so that when the two fires meet, there will be enough burnt ground between them that sparks and bunches of burning leaves will not blow across the line. It is important that the line be started far enough in advance of the main fire so that there will be plenty of time to start the back fire before it arrives. In many cases, men have been compelled to abandon hundreds of feet of line for this reason. Where it is necessary to fight a fire with back fire, first take your crew to the head of the fire. The success of the fight lies in controlling the header first. Divide your crew into two sections and send a gang downward on each side, working around the fire until they meet, or else until they run your line into burnt ground. The crew will be divided as follows: axemen, rakers, torchmen, and guards. The axemen go ahead and cut out a line 2 or 3 feet wide, clear of all young growth and brush. The line should be as straight as possible. Brush piles, logs, and dead snags should be avoided, keeping them outside of the line whenever you can. The material cut in making the line should be thrown away from the fire. Following the axemen come the rakers. Their duty is to rake the line clean of leaves down to mineral soil. The leaves should be raked towards the fire so as to give a good start to the back fire. The torchmen then follow and fire the line. The back fire should not be started until a considerable distance of line has been cut and raked. Behind the torchmen are the guards. They patrol the line to see that the back fire gets a good start and to prevent it from jumping across the cleaned line into unburned ground. There should be enough guards left behind to patrol several hundred feet of line. After the back fire has burned inward 15 or 20 feet, they should extinguish all fire along the edge of the line. If by any chance the fire should jump across the fire line into unburned ground, one guard should not attempt to put it out himself but should call for help. Concentrate the whole force, if necessary, in putting it out. If it gets beyond control, then the whole line is lost and the work must be started anew. After the head of the fire is under control, the wings must be taken care of immediately or else they may form a new head. Always back fire down hill and against the wind. The fire warden should know at all times the progress of the fight and the fire so as to be able to place more men at one point or reduce the number at another.

The fire is never out until the last spark is extinguished. A log or snag may smoulder and upon the freshening of the wind, break out and throw sparks, thus starting a new fire. When the fire has been surrounded and the work of the crew accomplished, the men may be discharged. Do not discharge your crew until you are sure all danger is over. Two or more men should then be left behind to extinguish all smouldering snags, brush piles, and stumps. Dead trees standing near the line should be cut down. The fire warden should also notify the owners of the land that they are expected to patrol the line, extinguishing all remaining sparks and preventing the fire from breaking out.

Effective work cannot be done without tools. No matter how large the crew, it is useless without tools. A few men with the proper tools are better than a large number poorly equipped. At the present time, each man brings his own tools. These generally consist of garden rakes, stable forks, mattocks, hoes, shovels, axes, and forked sticks. Sometimes it is necessary to borrow tools. In such a case, the warden should issue these borrowed tools to the men and make each man responsible for the return of the tool to the warden. If the man fails to return the tool, then the value of it should be deducted from his time. The appropriation of the Fire Bureau is so limited that it is not able to furnish the proper fire fighting tools to the wardens nor is it able to pay for any borrowed tool lost or stolen. It is hoped, however, that in the future, the appropriations will be of such a size that each warden can be furnished with fire fighting tools. The tools used for fighting fires on State Forests, and which are deemed the best, are rakes having 4 to 6 prongs and handles $3\frac{1}{2}$ feet long, hand axes, double bitted axes, short brush scythes, and iron fire torches.

The care of the crew is an important factor in fighting fires. The treatment the men receive will influence to a large extent their willingness to come out to future fires. A warden who keeps his men out on the fire line without food or water will have a difficult time in maintaining his organization. Where the fire is of such size that the men will be out a number of hours past meal time, arrangements should be made to supply them with food. A hungry man will not put much energy into his work and will desert at the first opportunity. If it is necessary to supply the men with food, have lunches packed in town and distribute them to the men along the fire line. Lunches should consist of sandwiches, cakes, and hot coffee. It would be well to include in the lunches tobacco. Men will leave the fire to get tobacco and not come back. In ordering lunches, provide well for the men, but not extravagantly. The men should at all times be supplied with drinking water. A forest fire is an attraction for the boy. Use him to carry water to the men along the fire line.

The last thing in connection with a forest fire is the making up of reports and bills. They should be made out on a typewriter or in ink, in a clear, legible, and orderly manner on the forms provided. In making out your forms, follow the printed instructions and if they are not clear, write for information. Many wardens have trouble when making out their bill for fire labor to know who was at the fire and the number of hours they worked. A permanent fire organization will eliminate this. For the present, have it understood that the men must report to you before going to work and must not leave the fire until discharged by you. An enforcement of this rule will enable you to keep a correct and accurate account of their time. The rate of pay must not exceed 15 cents per hour. Reasonable time may be allowed for going to and from a fire. All disputes about time should be settled at the fire. Pay the men promptly. Prompt pay means satisfaction and insures the turning out to future fires. The men must be paid by check. If it is not convenient for you to pay in that manner, indorse the check to the forester and he will make out the individual checks and give them to you for distribution. Have the men call for their checks. When this cannot be accomplished, mail the check to them. No owner, lessee, nor person employed by them, is entitled to pay for fighting fire on his land likewise no person responsible for the spread of a fire to forest land is entitled to pay for fighting fire. All bills must be forwarded to the Harrisburg office within 60 days after the fire occurred. Failure to get the bill in by that time will result in its not being honored. If the fire bill is small, it may be held for 30 days, and in this manner it is possible that more than one fire may be reported on Form 16. Incidental bills for team hire and provisions must be properly dated to agree with the date of the fire. They should be itemized, made out in your name, and receipted. Bills for transportation should show the distance traveled.

Make up Form 15 immediately after the fire while the information is still fresh. After a lapse of a week or ten days some facts will be forgotten.

Shortly after twelve o'clock the meeting adjourned for luncheon. Owing to the fact that many wardens had to take trains at 1:30 P. M., it was impossible to have an afternoon meeting. It was very apparent that two hours was not long enough to do more than touch upon a few of the points of interest to fire wardens. The coming together of those fire wardens for the first time, with few knowing each other, made it impossible for any kind of ready welcome upon the part of the foresters, and the men themselves were more or less backward in getting acquainted with each other. A badge of some kind would help a great deal in this matter and would be of considerable value in the field.



Old style tower from which forest fires were detected.

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The care of the crew is an important factor in fighting fires. The treatment the men receive will influence to a large extent their willingness to come out to future fires. A warden who keeps his men out on the fire line without food or water will have a difficult time in maintaining his organization. Where the fire is of such size that the men will be out a number of hours past meal time, arrangements should be made to supply them with food. A hungry man will not put much energy into his work and will desert at the first opportunity. If it is necessary to supply the men with food, have lunches packed in town and distribute them to the men along the fire line. Lunches should consist of sandwiches, cakes, and hot coffee. It would be well to include in the lunches tobacco. Men will leave the fire to get tobacco and not come back. In ordering lunches, provide well for the men, but not extravagantly. The men should at all times be supplied with drinking water. A forest fire is an attraction for the boy. Use him to carry water to the men along the fire line.

The last thing in connection with a forest fire is the making up of reports and bills. They should be made out on a typewriter or in ink, in a clear, legible, and orderly manner on the forms provided. In making out your forms, follow the printed instructions and if they are not clear, write for information. Many wardens have trouble when making out their bill for fire labor to know who was at the fire and the number of hours they worked. A permanent fire organization will eliminate this. For the present, have it understood that the men must report to you before going to work and must not leave the fire until discharged by you. An enforcement of this rule will enable you to keep a correct and accurate account of their time. The rate of pay must not exceed 15 cents per hour. Reasonable time may be allowed for going to and from a fire. All disputes about time should be settled at the fire. Pay the men promptly. Prompt pay means satisfaction and insures the turning out to future fires. The men must be paid by check. If it is not convenient for you to pay in that manner, indorse the check to the forester and he will make out the individual checks and give them to you for distribution. Have the men call for their checks. When this cannot be accomplished, mail the check to them. No owner, lessee, nor person employed by them, is entitled to pay for fighting fire on his land likewise no person responsible for the spread of a fire to forest land is entitled to pay for fighting fire. All bills must be forwarded to the Harrisburg office within 60 days after the fire occurred. Failure to get the bill in by that time will result in its not being honored. If the fire bill is small, it may be held for 30 days, and in this manner it is possible that more than one fire may be reported on Form 16. Incidental bills for team hire and provisions must be properly dated to agree with the date of the fire. They should be itemized, made out in your name, and receipted. Bills for transportation should show the distance traveled.

Make up Form 15 immediately after the fire while the information is still fresh. After a lapse of a week or ten days some facts will be forgotten.

Shortly after twelve o'clock the meeting adjourned for luncheon. Owing to the fact that many wardens had to take trains at 1:30 P. M., it was impossible to have an afternoon meeting. It was very apparent that two hours was not long enough to do more than touch upon a few of the points of interest to fire wardens. The coming together of those fire wardens for the first time, with few knowing each other, made it impossible for any kind of ready welcome upon the part of the foresters, and the men themselves were more or less backward in getting acquainted with each other. A badge of some kind would help a great deal in this matter and would be of considerable value in the field.



Old style tower from which forest fires were detected.



Forest fire rake designed by John L. Strobeck.

FIRE WARDENS' MEETING FOR MONROE COUNTY

Held at Pocono Manor Inn, March 18th.

For the third time, a director of the Pocono Protective Fire Association was host to the Monroe county forest fire wardens at an annual meeting. Mr. Edwin A. Hoopes kindly placed his beautiful inn with its conveniences, at our service, and provided dinner for all present.

The meeting opened at 10:15. There were present the five directors of the Association, the district forester of the county, a State game protector who was formerly a forest fire warden, the Chief Forest Fire Warden, and nineteen local wardens. Several men were detained at home on account of sickness, but most of the absent ones could not be present on account of heavily drifted roads. Mr. Hoopes, President of the Association, welcomed the men, after which the Chief Forest Fire Warden spoke upon the necessity of education concerning forest fires, co-operation for prevention and extinction, and promptness on the part of the wardens and their crews when a fire arises.

Mr. Hoopes spoke of the value of cautioning people who frequent the woods, and of the use of fire extinguishers. Mr. Strobeck explained the Protection Code with respect to fire hazards and nuisances, and requested the wardens to report such conditions to him promptly. On behalf of the Association he then presented to each warden present an adjustable iron rake, devised by himself, and explained its use. (See photograph).

Mr. DeHaven, a patrolman, who has rendered very efficient service, spoke of the co-operation he was getting from railroad men and that conditions were getting better each year. He has been given the privilege of riding upon certain trains in order to get promptly to a fire along the right of way.

There was then a general discussion of the duties of patrolmen, and results obtained by them; the getting of men out to fires; penalty for refusal to help extinguish a fire; rates of pay; dishonest claims for pay; huckleberry fires and incendiary fires. This being the third meeting of these wardens, they were more at home with each other and had a very full discussion of subjects of interest. The interesting fact was brought out that some owners of lands devoted to the growing of huckleberries were under the impression that they



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dare not burn off their own land for the improvement of the crop. Consequently, it is believed they set fire under cover and without regard to where it is stopped. If this impression can be changed, probably many large fires in the Poconos can be prevented.

The Secretary, Wm. R. Fisher, reported upon his visit to Boston and his attendance upon the meeting of the American Forestry Association. He reviewed particularly the advances in forestry activity and especially in forest fire protection.

Mr. J. A. Seguire appealed to the local pride of the wardens and spoke of the patriotism of their work. He urged co-operation among themselves and with every force available. Mr. Chas. N. Thompson spoke of the importance of forest protection to the Poconos. Because of their being a resort region, the green forests and running streams must be maintained.

FIRE WARDENS' MEETING FOR TIOGA COUNTY

Held in Court House, Wellsboro, March 20th. *Chairman*, William Kimball;
Secretary, Thos. C. Harbeson.

Considering the condition of the roads, there was a very high percentage of our wardens in attendance. Only eleven men out of forty-five were absent. One man walked six miles over snow drifts to be driven sixteen miles in order to be present. Others walked or drove and some came on the train. Dinner was had at the Cole House and the meeting was called at about 1:30 P. M. in the Court House.

We were fortunate in having Hon. Robert K. Young present. He welcomed the wardens to Wellsboro, impressed upon them the importance of forest preservation and stated that the forestry work of the State is among the most important activities of the State, if not the most important. He approved such meetings because of the co-operation and efficiency they would foster. He further urged each one present to work for an aroused sentiment in favor of all forestry work.

The Chief Warden addressed the men and was followed by warden R. S. Brown of Morris, opening the discussion of "Local Attitude Towards Forest Fires." He suggested more publicity, and especially the printing of fire laws in newspapers. He spoke of rates of wages for fighting fire being small, the carelessness of hunters, fishermen, and smokers.

Hon. Horace B. Packer, told of the importance of forest preservation.

Forester John W. Keller then spoke on "Organization for the Extinction of Forest Fires," as follows:

In discussing this subject I want to take up the principal phases of the work from the moment the fire starts until the men have received their checks for services rendered. That old adage that the actual work at the fire is the only part of forest fire extinction is a thing of the past. The actual attack is so dependent upon other parts of the work and so many conditions must be considered that we must go deeper into the details if we hope to solve the problem.

The real keynote of every successful business enterprise in this day and age is organization. We find it in every plan from that of the day laborer to the President and it must be followed to bring results. Just so in forest fire extinction, if we are to be successful we must organize our work. It has not been so long ago, and I am sure we all remember the time, when wardens never thought of forest fires until they were notified. Then they picked up any men who could be had and did the best they could. We need but look at our Tioga county hills to be convinced of the folly of this method in keeping down forest fires. It has been tried and found wanting. Let us learn a lesson from the price we have paid and organize our work for the future.

Our Chief Fire Warden has been deemed the proper man to organize this work in the State. He has appointed what we believe to be a competent force of wardens in our county. The fact that he has called this meeting shows that he is doing his work but it remains for us to organize the work for individual fires. Conditions are so varied in the different localities that it is impossible to draw up a general plan. Nevertheless our organizations should all strive for the same end, namely, the suppression of fires as quickly as possible. The State work is being organized as a whole. Let us lend our aid by organizing for individual fires in our several districts.

What are the duties of a fire warden as they appear in practice? A fire starts in your district. Your first duty is to know that a fire is burning. A warden has the work of his usual vocation to look after and cannot be expected to spend his time looking up fires which may never start. On the other hand the present appropriations for fire extinction are too small to permit the building of fire towers or the employing of patrolmen at all of the danger places. Hence the warden must get this information from other sources. Everyone in the community should know that you are a fire warden and should be made to feel it his duty to report to you any fire that may come to his notice. Persons who live near the danger places, or those having a commanding view of the wild lands should be especially induced to get this information for you. If there are telephones you can use, early reports as a rule will be forthcoming. However, where there are no telephones, arrangements should be made with some one to act as messenger so the information will reach you as soon as possible. Your own conditions will govern the methods you can employ but you should have it worked out to such a system that you can depend upon it for results. Figuratively speaking, you should be able to cock your feet up on the best chair in your house and smoke five cent cigars during the entire fire season, *knowing* that you will receive information of the first sign of smoke which arises from your district. Too many of our men in the past have trusted to luck for this information and by the time it would reach them the fire had grown to such a size that it could be stopped with difficulty.

You all know the value of getting to a fire immediately after it has started. You also know that all big fires have small beginnings, therefore, never make a practice of waiting until you see a lot of smoke before you think it necessary to go. Your assistance is most needed when the fire is small and you should take advantage of it and be on hand as soon as you can. If it is nothing but a smouldering camp fire, put it out.

Having received word that a fire is burning in your district, the next to be considered is the fighting crew. You should know before a fire starts, what men you can get in case of necessity and should arrange to have them go with you. These men should also know the work required of them, and should have the proper tools for that work ready at all times during the fire season. There should also be a general understanding that the men take a small lunch along. Don't forget to provide a means for getting word to your men when they are needed.

The past appropriations for fire extinction have not been adequate to meet all the needs of the work. This is shown in the matter of tools. Each warden should have the necessary tools on hand but this will not be possible until the appropriations are increased. As to the kind of tools, that is strictly up to the warden. In some parts of the State garden hoes are used, in others, rakes, mattocks, forked sticks, plows, etc., so it remains for the warden to use his own judgment.

The men have collected with proper tools and are ready to leave. The next step is to get them to the fire as quickly as possible. It may be one mile or it may be fifteen miles away. Your previous arrangements should include a means of transportation which will get them to the scene of the fire in the easiest and shortest way. Automobile and team owners should be consulted beforehand so that they can be notified when you are summoning the fire fighters. This will give them time to get their conveyances ready by the time your crew is together and no time will be lost. If the fire is near at hand, don't bother with a conveyance as you will get there quicker by walking. No unnecessary expenses should be incurred.

As a rule, there are few instructions you want to give your men and you can do this on the way to the fire.

The next is the attack. While this is important, what has been said is enough to show that it is not the only part of the fight. Here we must be cool-headed and do some thinking before we begin our work. With the flames leaping, the brush cracking, and the wind blowing, we are apt to get somewhat excited and want to be doing something. That is just the time we should take a few minutes' time and size up the general situation. Notice the prevailing wind, the general topography, the header, and the rapidity with which it is traveling. Consider the number in your crew and where they can do the most effective work. When you are sure you have the general situation well in hand, set your men to work on the header and follow up with the side lines. Use good judgment and your small organized crew will work wonders.

Many of the old firefighters in this region will tell you that nothing can be done towards putting out a fire until night. This is a wrong impression. As soon as you have been notified that a fire is burning, go at once. If you arrive when the wind is high and everything looks bad, don't allow it to scare you. Collect yourself and then attack at the best point. You can do something to help extinguish a fire no matter when you arrive upon the scene.

Never allow yourself to be so absorbed by the fire that you forget your crew. Always remember that they are human and must have water to drink and food to eat. The State never asked you to starve your men. If it is necessary to keep them out longer than eight hours, provide food and be sure you have enough of it. There is nothing you can do that will make fire fighters lie down on you quicker than to fail to provide food and water when necessary. Take good care of your crew at all times.

As your crew is working along, don't forget to have a good reliable man follow you up. It is not possible to put out all the sparks when you go over the line the first time. The man or men forming your rear guard will assure safety over the lines you have worked. This is essential.

"A fire is never out until the last spark is dead." Do not take any chances. When you have surrounded the fire and have it under control, send a man around the entire line to make sure every spark is out. It may be necessary to put on a patrol for a day or possibly two, but this is better than allowing it to break out afresh.

I have tried to explain the important features which enter into the organization of forest fire extinction plans. Local conditions have much to do in solving the problems. Whatever you decide to do, make your plans before you are called out to a fire and you will soon be convinced that organization pays.

But you may ask if this will work out in practice. I say yes, and I can show you by results obtained in the southwestern part of our county. It will take a very few minutes for me to explain the protection policy as it appears and as it works out in practice on the State and on private lands coming under our supervision.

We cover approximately 90,000 acres of wild lands of which the State owns 30,000. We have three telephone lines operating in the district which control about 48 miles of line. People who have phones have been co-operating with us and telephone immediately when fires originate near them. We have two towers on State land with telephone connections. A ranger with a test set is stationed on one of these towers every day during the fire season. In the event of hazy weather we have a man on each tower. The moment smoke arises from any part of State or private land within our limits, it is detected and telephoned to the office of the forester. The men on these towers are thoroughly familiar with the lay of the land and can tell within a very short distance, the exact location of any fire which may start.

We have signs along the railroad asking the trainmen to report forest fires to the nearest tower. The operators in these towers have instructions to telegraph the message immediately to Blackwell Station where it is transferred to the forester by messenger. In this way we keep in close touch with fires originating along the railroads.

Thus we have three distinct ways of detecting a fire the moment it starts. First, by the people and the use of the telephones; second, by the men in the towers; third, by the railroad employees. Last spring we had a fire seven miles from Blackwells and it was reported to the forester by each of these agencies within twenty-five minutes from the time it started.

Men are scarce everywhere over the district because it is so sparsely settled, hence we try to meet the situation by getting a crew together for work on the State lands during the fire season. This coming spring, we shall be planting trees and have our camp with twenty men on the top of the mountain. We shall string a mile and a half of telephone line from our camp to connect with the main line in the valley below. While the men are working, the cook will tend the telephone and will report all messages of fire to the forester in charge. Arrangements will be made with automobile owners and in case of fire they will be notified by telephone to have their machines at the most convenient place to meet the men. Tools for fighting fires will be in readiness at the camp and no time will be lost in getting started. We use canteens for carrying water for the men and have an order made out in advance for food, so that the nearest storekeeper can pack it in a convenient manner when needed. This saves time and avoids mistakes.

By the organized system we have reduced the average acreage burned over by each fire from 904 acres in the year 1911, to 17 acres in 1915, while the number of fires has been reduced from 23 to 11 in the same period. Our system is much better now than in 1911, but it is far from perfect. Each year we hope to see improvements.

If an organized fire fighting force has done this much good for us in the southwestern part of the county, it will do it for you in your region. Organization is the keynote and the quicker all the wardens fall in line, the quicker we will have the fire hazard in Tioga county under control.

Meeting adjourned at 4:15 P. M.

FIRE WARDENS' MEETING FOR HUNTINGDON COUNTY

Held in Community House, Huntingdon, March 23rd. *Chairman*, H. H. Burdge;
Secretary, T. Roy Morton.

Many of the wardens came to the Huntingdon County Community House in the morning and got acquainted with each other, but there were fourteen wardens out of forty-six who were not present. For a time, there was considerable dissatisfaction among some present both about their duties and about the rate of wages allowed employees. As the afternoon meeting progressed, this feeling seemed to change and a better understanding existed.

After having dinner at the Leister House, the wardens returned to the Community House and the meeting was called at 1:15. After the address by the Chief Warden, warden E. W. Stryker opened the discussion on "Local Attitude to Fires." He stated that in his locality, hunters were careful in the woods and brush burners were careful. He thought that the price of lumber and the leasing of camp sites on State land were inducements to be careful with fire. Mr. E. S. Heeter of Clay township stated that he had to contend with three causes of fires, viz.: The East Broad Top Railroad, cattlemen, and sawmills. He also has difficulty in getting men to help him.

Dr. E. H. Green contended that most fires in his district were caused by city hunters. There should be a penalty for smoking animals out of trees and logs. The press should be used to enlighten hunters.

There were discussions as to getting men, causes of fires, and methods of extinction. Forester A. W. Bodine took up in detail the outline submitted on fire extinction.

FIRE WARDENS' MEETING FOR MIFFLIN COUNTY

Held in Rod and Gun Club Room, Lewistown, March 24th. *Chairman*, E. L. Mertz; *Secretary*, D. K. Warfield.

Meeting was called to order at 9:30 A. M. All wardens but five were present. After the address by the Chief Warden, there was a general discussion as to local attitude of the people with respect to fires. The opinion was that the people generally were against the burning of the forests, but that ignorance is the cause of what indifference exists.

There was a general discussion as to how the wardens could work for forest protection and suggestions were made.

Mr. Warfield spoke of the value of young trees. Mr. Bodine requested the wardens to ask wood cutters to lop tops on their operations.

Ranger G. Edw. Ross exhibited a homemade iron rake which has proved very efficient in forest operation and in fighting fire. These rakes could be made for about 50 cents each.

Ranger William Wirth exhibited another homemade rake having a heavy wooden head with large spikes for teeth. This rake can be made for about 10 cents.

Mr. A. W. Bodine spoke on the "Extinction of Forest Fires," after which the meeting adjourned for dinner at the Crystal Restaurant.

FIRE WARDENS' MEETING FOR UNION COUNTY

Held in Parlor of Buffalo Valley Inn, Mifflinburg, March 25th. *Chairman*, Harry S. Frock; *Secretary*, A. C. Silvius.

The whole force of wardens in Union county was present except one forest ranger and one fire warden who was instructed not to come on account of distance and expense. One of the men on the roll and

marked absent, it was afterwards learned had died. One warden walked twelve miles and back over well drifted roads and through slush to attend the meeting.

The meeting was called at 1:30 P. M. After the address of the Chief Warden, Mr. J. C. Ruhl opened the discussion of local Attitude to Fires. Some people were not opposed to fires burning. He asked for better means for detecting fires, and getting to fires, and for better equipment.

It was suggested that if the people of the county could be led to see the loss to fish and game, they would change their attitude.

There was considerable discussion as to equipment. Some favored knapsack sprayers, sprinkling cans, buckets, canteens, etc.

Mr. A. C. Silvius then discussed methods of fire extinction.

FIRE WARDENS' MEETING FOR CLEARFIELD COUNTY

Held in Arbitration Room of Court House, Clearfield, May 27th. *Chairman*, Andrew McQuown; *Secretary*, Wm. F. Dague.

Although the day of meeting was very disagreeable, all but six of the wardens were present and one had been instructed not to come on account of great distance. The meeting was opened at about 1:30 P. M., after dinner had been served at the Leonard House.

After the address by the Chief Warden, there was a general discussion on local attitude and instructions to wardens. Many questions were asked.

The difficulties resulting from the presence of the foreign population were discussed. They must be reached and educated in some way. Warden Sarowy was complimented as being the best man in the county to get along with the foreign element.

The wage question is a large factor all over Clearfield county. Mr. J. C. Hubler discussed the need of patrolmen, and co-operation with property owners.

Mr. Carl L. Kirk discussed the subject of Fire Extinction, and the meeting adjourned at about 4:30 P. M.

FIRE WARDENS' MEETING FOR BEDFORD COUNTY

Held in Court House, Bedford, March 28th. *Chairman*, W. A. Carpenter;
Secretary, Wm. L. Byers.

Notwithstanding heavy rains and bad roads, there was a large percentage of the Bedford county wardens present at their first meeting. After dinner at the Grand Central Hotel, the meeting was called at 1:15 in the Court House.

Mr. J. L. Tenley, probably the oldest man in point of service among the wardens, opened the discussion as to local attitude with respect to forest fire. He related old methods when constables paid men for fighting fire and the county commissioners refused to pay the constables. He reviewed the past developments in forest fire work and He reviewed the past developments in forest fire work and remarked remarked that it has been an educational period and that we are not yet out of it.

There was then a general discussion as to the best method of fighting a fire. It was admitted generally that the fire burning most rapidly should be stopped first.

Prof. Lloyd Hinkle, County Superintendent of Public Schools, addressed the wardens and complimented them for being assembled for such an important work. He spoke of the great loss resulting from fires, the loss to lumbermen, the barren hillsides and consequent floods, and of the influence of beautiful surroundings upon the people in general and upon children in particular.

After the Chief Warden had spoken, there was a general discussion, and a number of questions were asked about the duties and powers of fire wardens.

FIRE WARDENS' MEETING FOR NORTHERN CENTRE COUNTY

Held in Court House, Bellefonte, March 30th. *Chairman*, Hon. J. Linn Harris;
Secretary, George W. Sheeler.

Every fire warden but one was present, also one man who wanted to be a warden but who had not yet received appointment. The meeting was called promptly at 10:00 A. M. and Judge Quigley welcomed

the men to Bellefonte. He spoke of the importance of the work and the value of such meetings. The chairman then emphasized the importance of our work, the value of organization and of getting the men together.

The Chief Warden addressed the wardens, and then each one present was called upon for some remarks.

This meeting was under the direction of the Central Pennsylvania Forest Fire Protective Association and practically all the officers were present and most of the Board of Directors. Mr. C. T. Fryberger, Vice-President, impressed upon the men four things, viz.: that they were picked men, that they should get after fires quickly, that their work as fire wardens is a contribution to the good of the community, and that when they see a smoke in the woods, each man shall make up his mind to be "boss of the smoke." The latter expression became a favorite in the meeting.

Forester John W. Keller was present and spoke on the necessity of complete organization, even before fires started.

Mr. W. C. Snyder, a director of the association and an official of the Lehigh Valley Coal Company, spoke of the value of local crews.

George W. Sheeler, Secretary and Forester of the Association, emphasized the need of prevention and mentioned the necessity of removal of hazards along railroads, about sawmills, etc., and the value of cautioning people who entered the forest. He requested wardens to be particular in reporting fires so as to give every possible detail.

Mr. James Uzzle spoke of organization, railroad fires, and care of crew. He stated that foreigners in his territory were not often the cause of fires, but that so much land is now posted against hunters and fishermen that he believed this condition of affairs to be responsible for many fires and the difficulty of getting men to fight fire upon such land. He also thought it might be a good thing to educate the Governor, the legislators, and other State officials as to the need of forest fire prevention and control.

Mr. Kelley emphasized the need of staying on the ground until the last spark is extinguished. His own experience shows the value of forest protection. Others suggested that the State must pay prevailing wages in order to get good men and that roads should be cleaned up and kept clean.

After a very satisfactory meeting, dinner was had at the Brockerhoff House.

FIRE WARDENS' MEETING FOR CLINTON COUNTY

Held in parlor of Commercial Hotel, Lock Haven, March 30th. *Chairman*, Wm. McKinney; *Secretary*, H. F. Critchley.

The meeting was called to order at about 1:30 P. M. Mr. H. W. Siggins addressed the wardens, setting forth the same ideas presented at other meetings by the Chief Warden. A general discussion followed upon local attitude to forest fires in various parts of the county and a number of wardens took part. Foresters F. H. Dutlinger and H. S. Metzger spoke on the extinction of fires. A very important point brought out for Clinton county was the need of more telephone lines.

The Chief Forest Fire Warden arrived before the meeting had adjourned, and was able to answer some of the questions held over for him. The need of an educational campaign in Clinton county is evident.

FIRE WARDENS' MEETING FOR CAMERON AND ELK COUNTIES

Held in Ladies Aid Hall, Driftwood, March 31st. *Chairman*, W. H. Weed; *Secretary*, W. H. Horning.

The meeting was called to order at 10:30 A. M.

After the roll call and the address by the Chief Warden, George B. McClintock read a very interesting paper showing a changed attitude upon the part of the public with respect to fires. The spirit of co-operation for fire extinction now prevails. Operators in dangerous country are closing down their mills and engines during dry weather. Others are taking precautions. Still education is necessary.

During the discussion, there was brought out the scarcity of labor and the necessity of co-operation on the part of the railroad companies. On account of steep hillsides, protective strips do not seem practical.

Forester W. B. Evans discussed the subject of fire extinction in a very practical way.

The same intense interest and spirit of self sacrifice was evident in the men at this meeting as had been evident in the other counties.

FIRE WARDENS' MEETING FOR BERKS COUNTY.

Held at Berkshire Hotel, Reading, at 10:00 A. M. and at Court House at 2 P. M. April 3rd. *Chairman*, Solan L. Parkes; *Secretary*, James E. McNeal.

The meeting was called in the reception room of the hotel, and after the address of the Chief Forest Fire Warden, many of the wardens spoke of conditions in their respective localities, and asked various questions. Tramps and railroads were blamed for most fires in Berks county.

Hon. I. C. Williams impressed upon the men the necessity of arousing their neighbors to understand the need of fire prevention and forest protection, the necessity of their being diplomatic, winning the co-operation of every one, including the newspapers.

The meeting then adjourned for luncheon in the Grill Room.

At the afternoon meeting, the Reading Boy Scouts were present. James E. McNeal, District Forester, read a paper on fire extinction, which was followed by discussion. Mr. Williams spoke on the Patriotism of Service as applied to forest protection. Mr. Wirt spoke to the Boy Scouts on "Be Prepared" and "Do a Good Turn Daily," as relating to forest fire prevention, and tree planting. A member of the Boy Scout Council and President of Berks County Firemen's Association, and Mr. Tyson, Superintendent of Parks and Public Property, both spoke to the Scouts and wardens.

Hon. Henry D. Green then spoke on "Whether Forest Protection Pays." He impressed upon the boys the necessity of clean outdoor life in touch with nature. The use of the forests for recreation and as a source of beauty pays in dollars and cents.

After the Berks county meeting, the following letter (Circular letter 10) was sent to every warden who had been present at one of the meetings:

April 5, 1916.

Dear Sir: Meetings of the local forest fire wardens have now been held in most of the counties in which the reorganization under the new law has been completed. The results of these meetings have been very satisfactory. Evidences of enthusiasm have been apparent everywhere. We have been highly gratified by the display of interest on the part of the wardens, many of whom put themselves to considerable personal inconvenience to attend the meetings.

We wish to take this opportunity to thank you for the interest you have shown, and to express the hope that you will not allow it to lag. Owing to the small appropriation allowed us, much of the results that are accomplished this year must be due to personal efforts on the part of the wardens themselves. By arousing local interest in forest protection it is hoped that each member of the legislature can be induced to support an appropriation of \$75,000 a year for protection of our woodlands. This amounts to a cent an acre for the area protected, and will enable us to complete a permanent and effective protection system.

We sincerely hope that you will feel no hesitation in writing to the Department whenever you desire to offer any suggestions for the improvement of local or general conditions, or ideas for interesting the people of your county or the whole State in your work. Before the next legislature convenes we must have the whole State ablaze with enthusiasm for the protection of the forests.

FIRE WARDENS' MEETING FOR McKEAN COUNTY

Held in Tide-Water Building, Bradford, at 1.30 P. M., September 8th.

District Forester R. Lynn Emerick acted as chairman of the meeting, and introduced the Chief Forest Fire Warden. After his remarks, there was a general discussion concerning forest fire conditions within the county, the attitude of the people, causes of fires, wages, bills, and reports. The subject of fire extinction was also discussed. Ten of the eighteen wardens on the roll were present. Several other persons interested in fire prevention and extinction were also present. The expenses of the meeting were \$24.44.

FIRE WARDENS' MEETING FOR FULTON COUNTY AND PART OF FRANKLIN COUNTY

Held in Court House, McConnellsburg, 10.30 A. M., and 1.30 P. M., October 11th.

Forester A. E. Rupp acted as chairman of the meeting. After the roll call and the address by the Chief Forest Fire Warden, there was a general discussion of the forest fire situation. At the afternoon meeting, many questions were asked concerning the duties of wardens and Mr. Rupp discussed the subject of fire extinction. He also touched upon methods by which the cause of fires might be determined.

This meeting was intended to include all the wardens of Fulton county, and out of 36 on the roll, 31 were present. All wardens of northern and western Franklin county were expected to be present also. Sixteen out of 19 were present. There were two State Forest rangers present, making a total of 50. The expenses of the meeting were \$110.39.

BADGES

Ever since the passage of the Act of 1909, there have been many requests from wardens for some sort of badge. During the latter part of this year designs were submitted by a number of the State foresters, and one finally adopted. The badges, which will be ready

for distribution early in 1917, are circular, 1½ inches in diameter. Around the outer edge are the words "Pennsylvania Forest Fire Warden" in raised letters. In the center is a keystone with a raised oak leaf. The badge will have a polished nickel finish.

RATE OF WAGES

The one question that was uppermost in the minds of the wardens in every county was that of wages for men. Fifteen cents per hour is lower than the average rate of wage in practically every part of the State. A warden may realize the necessity of fire extinction. He may be well aware of his authority to summon men under penalty for refusal, yet he hesitates to ask one of his friends or neighbors, who may not be interested very much in forest protection, to quit a job paying 25 or 30 cents per hour for one paying 15 cents per hour, and a very unsatisfactory job at that. This proposition has made it difficult for us to find good men quickly for the position of local forest fire warden. It must be admitted that fighting fire is a very hot, dirty, tiresome, and sometimes dangerous work. Not infrequently damage is done to shoes and clothing, requiring more outlay for repairs than the amount of wages received for fighting fire. Any one who fights fire and works honestly earns 25 cents per hour and more.

Still there are those who say that even at 15 cents per hour, there are people who will set fire in order to get work. This has been a common statement ever since the State has endeavored to prevent or control fires. It may be granted that some few fires will be started for this reason. It would not be the first time, or the only method of starting something in order to get money unjustly from the State. But the instances evidently are so few that there need be no alarm about very much money being wasted in this way. For the man who wants money can find many ways of getting it easier.

A possible solution to the trouble may be to pay regular wages earned by the men who can be organized into a local fire crew by the forest fire warden. This will make possible the choosing of good men in a community to be trained for a community service and at little or no loss to themselves. They will see to it that fires are promptly suppressed, and other assistants will not be needed. Ten good men on a fire line will do more than fifty untrained and careless people. Should other persons be needed at any time, the fire

warden may call upon other people and pay them fifteen cents per hour, or any other rate determined upon by the Commissioner of Forestry for the State or any particular district. This proposition, if carefully worked up, will solve a number of problems which have to be faced under the present unsatisfactory conditions.

CO-OPERATION

During the year we have endeavored to maintain co-operation with various State Departments and their employees, and at the same time to interest new forces.

GAME COMMISSION.—In his report as Secretary of the Game Commission for 1915, Dr. Joseph Kalbfus writes as follows:

"From observation extending through many years, I am satisfied more harm is done to the cause of game and wild bird increase by forest fires, then is done in any other way, and especially by early spring fires, when our birds are nesting, or at a later period, when the young of both animals and birds are helpless. Aside from this, the destruction by fires of the growing trees and shrubs and vines, through which a food supply for wild creatures is produced, is a most serious proposition and some radical step should be taken to have our people, not only sportsmen, but all our citizens, understand that each individual will be held responsible for the damage done by forest fires in his district. Sportsmen should see to it that every possible aid be given our Department of Forestry in the care of lands under its control. The man who either wilfully or negligently starts a forest fire should be made to understand that he is not specially injuring the Department of Forestry, but instead is destroying something that belongs to all the people, that when gone can perhaps never be replaced. Such people are undoubtedly criminals and public enemies, and every sportsman in this State should constitute himself a committee of one to see to it that such criminals are placed behind the bars, where they belong. When we consider the loss sustained and the vast injury done by forest fires, it seems to me the expense of keeping in prison the men who start these fires is but a small item as compared with the possible loss that may come through their being at large."

In April the following correspondence took place:

Harrisburg, Pa., April 20, 1916.

Dr. Jos. Kalbfus, Harrisburg, Pa.:

Dear Sir: Will it not be possible to have placed upon the licenses which will be issued to hunters this fall some brief statement with reference to the necessity of carefulness with fire in the woods? Such a statement need not be lengthy. In fact, the shorter it is, the better. The following might be used: "Please be careful with your fire in the woods" or "Forest fires destroy game."

As you know, we are now reorganizing our forest fire wardens all over the State and this organization will soon be in such a condition that the fire wardens will be able to cope very satisfactorily with the forest fires that occur. The principal difficulty, however, in the majority of cases, is in the fact that fire wardens do not receive notice of forest fires as soon as they have started. In this particular phase of our work, your game wardens can be of great service to us. We are just publishing a list of the forest fire wardens in the State, and with this list in the hands of your men, would it be agreeable to you to issue instructions from your office to all game wardens to co-operate closely with the forest fire wardens by keeping a close lookout for fires, and upon discovering them to report promptly to the nearest fire warden? If such a letter can be issued from your office, we shall be very glad to see that it is inclosed with a list of our fire wardens to each of your men, providing, of course, we can obtain an up to date list from you to be placed in the hands of the Division of Distribution of Documents.

Yours truly,

(Signed) ROBERT S. CONKLIN,
Commissioner of Forestry.

Harrisburg, Pa., April 21, 1916.

Hon. Robert S. Conklin, Commissioner of Forestry, Harrisburg, Pa.

My Dear Sir: We are just in receipt of your letter of the 20th inst., and beg to advise that we intend placing on one side of the Summary on the back of the 1916 Licenses the following:

"Forest fires destroy game. It is to your interest to guard against them."

On the other side of the Summary we intend placing the following:

"Please be careful with your fire in the woods. It means more game to you."

We are also preparing a letter, as per your suggestion, to send out with the lists of your fire wardens and will forward same to you on Monday or Tuesday, together with complete list, in triplicate, of our Special Deputy as well as our Regular, Salaried Game Protectors.

Respectfully yours,

JOSEPH KALBFUS,
Secretary, Game Commission.

Harrisburg, Pa., April 21st, 1916.

TO ALL OFFICERS OF THE GAME COMMISSION:

My Dear Sir: Enclosed please find a list of fire wardens as appointed by the Department of Forestry in the various sections of the State, and we ask that you keep on the lookout for forest fires and notify the Fire Warden nearest to you immediately when you see or hear of a forest fire, *and yourself, help in extinguishing such fires* in every way possible, as forest fires destroy more game than legitimate sportsmen kill in years.

Do all you can to create sentiment in favor of preventing forest fires at all times. Do what you can to create sentiment that will influence members of the coming Legislature to give to the Department of Forestry an appropriation sufficient to insure the work expected of them, to buy additional wild lands and to care for that land as it should be cared for. It is as much your duty to look after these matters as it is to prosecute violators of the Game Laws or to do anything else in the line of your work.

Respectfully yours,

JOSEPH KALBFUS,
Secretary, Game Commission.

As a result of the foregoing, every hunter who purchased a 1916 license, had his attention called to the necessity of care with fire in the woods. We hope that the idea of having a line or two concerning forest fires upon the hunting licenses may become a permanent feature.

The game protectors and deputy game protectors have been co-operating with us in many ways. They have notified our fire wardens when fires have come to their notice; they have assisted in the extinction of fires; they have given their time and the use of their own automobiles in the reorganization of the fire wardens; and in other ways assisted in the work of fire prevention and extinction. In Indiana county, largely through the efforts of the game protector, two outlaws accustomed to set fire to buildings and forests in order to see the fire burn, were apprehended.

Unfortunately we were not able to supply the special deputy game protectors with rosters of forest fire wardens. The letter of instructions was sent to them later, and again to the game protectors, with the following circular letter from our office:

October 20, 1916.

TO ALL OFFICERS OF THE GAME COMMISSION:

Dear Sir: Owing to a mistake on the part of the printer we are short two thousand copies of our list of fire wardens and consequently are unable to supply you with such a list this season. However, we hope you will do all in your power to protect the forest from fire and will co-operate with our local wardens as they become known to you.

Inclosed are copies of literature and stickers which we shall gladly supply to any one who will use them to good advantage. Let us know if you wish to have some sent you, specifying the number of each that you can use.

B. F. P. Circular letter 16.

As a result of this circular, a fair percentage of game officers requested literature and distributed it.

DEPARTMENT OF FISHERIES.—The following correspondence shows that we have had the same cordial support from the officials of the Department of Fisheries:

April 20, 1916.

Hon. N. R. Buller, Harrisburg, Pa.

Dear Sir: In behalf of the closer co-operation of your fish wardens and our forest fire wardens, I shall be glad to have your opinion upon the following proposition.

We are just having published a list of our forest fire wardens as they are now located all over the State. By reason of the reorganization of our forest fire warden system, these men are, or soon will be, in a fair position to cope with the forest fire problem. However, in the majority of cases, a great handicap is present because of the fact that fires do not always come to the attention of the fire warden as promptly as they might. Therefore, any assistance which we can get from any officials, organizations, or private individuals which will help us in having notice of fires given promptly to the fire wardens will be of great service. Would you be willing to issue a letter from your office to each of your wardens, instructing them along this line, namely, that just as soon as they discover a forest fire in any portion of their territory, they shall consult the roster of wardens for that particular region and notify the nearest forest fire warden? If such a letter is prepared, it is altogether possible that we can have it sent right with our list of wardens, providing we have an up to date list from you so that we may place it in the hands of the Division of Distribution of Documents.

Yours truly,

ROBERT S. CONKLIN,
Commissioner of Forestry.

Harrisburg, Pa., April 26, 1916.

Hon. Robert S. Conklin, Commissioner of Forestry, Harrisburg, Pa.

Dear Sir: Upon my return to the office after an absence of ten days I find your letter of April 20th requesting the co-operation of the wardens of this Department with your Forest Fire Wardens. This Department will willingly co-operate with you in this work and I have this day sent to each warden of this Department a letter instructing them that they should at all times co-operate with your Forest Fire Wardens, and should they discover a forest fire, they should immediately take it up with the warden in the particular region in which the fire is.

While the law allows the employment of thirty fish wardens, the appropriations will permit the employment of only ten.

Attached hereto is a copy of the letter written to the wardens, also a list of the wardens together with their home addresses. If you will have sent to each of the wardens shown on this list, a list of your wardens, it will be carried by the men of this Department at all times, and you can rest assured that this Department will co-operate with you in every possible way.

Very truly yours,

N. R. BULLER,
Commissioner.

April 26, 1916.

Dear Sir: You will receive from the Department of Forestry a list of the Forest Fire Wardens of that Department and you are hereby directed that should you run across any forest fire at any time, or have knowledge of any such fire, you will at once consult the roster of wardens and notify the nearest forest fire warden. This is a very serious problem and you will co-operate with the Forestry Department in every way possible.

Very truly yours,

N. R. BULLER,
Commissioner.

The fish wardens have reported fires to our fire wardens, have helped to extinguish them, and in a number of instances put out small fires before they reached a size large enough to do damage. This force ought by all means to be increased on account of its own work and on account of the many small fires which an increased number of such men patrolling streams would extinguish. Many of our spring fires originate from small fires built by fishermen who leave them without seeing that they are extinguished.

STATE POLICE.—This Department has always been granted assistance by the State Police force if it has been at all possible to comply with requests. This year, as formerly, the policemen have assisted in fire extinction and in the detection of those responsible for forest fires. By special request, three patrolmen stationed at Cresson were instructed to pay particular attention to forest fires. Along the State Highway across Laurel Ridge in Westmoreland county, travelers have been accustomed to build fires for warming lunches. Frequently such fires have spread and done considerable damage. The matter was referred to the State Police and during the dry period of November and December, special patrols have been on duty.

As a result of investigation by State Policemen, suit was instituted in Monroe county against four men for firing the woods. These men plead guilty and were fined. Also, a suit was brought against the Lehigh Valley Railroad Company in Luzerne county.

There is no question as to the fact that if the State Police force were doubled, game, fish, and forest law violations would be reduced greatly, violators would be brought promptly to account, and it would be necessary to employ only a few special patrolmen during forest fire seasons.

STATE HIGHWAY DEPARTMENT.—The following circular letter was sent to the fifty Superintendents of State Highways.

July 19, 1916.

Dear Sir: In accordance with an agreement with W. D. Uhler, Chief Engineer of the Department of Highways, it is our desire to place in your hands, and the hands of each foreman and patrolman, a list of the forest fire wardens of the State so that when any of your men discover forest fires, they may be reported promptly to the proper warden who will take immediate steps for their extinction. Will you be kind enough, therefore, to either send me the names and addresses of the foremen and patrolmen under your direction, or give me the number of copies which you will require for distribution?

A prompt reply was received from each superintendent, either giving the names and addresses of their foremen, or stating the number of lists of fire wardens required. Many of them expressed a willingness to do all in their power to assist us. Before all the replies were received, however, it was found that our supply of fire warden lists would not be sufficient for our needs and the following letter had to be sent to the superintendents.

Harrisburg, Pa., September 13, 1916.

Dear Sir: Under separate cover you will receive a copy of the report of the Chief Forest Fire Warden for the year 1915. I call your attention to the correspondence set forth on pages 37, 38, and 39 of this report.

During the summer I have had correspondence with most of the Highway Superintendents, who have given me lists of foremen under their direction to whom copies of this report could also be sent. Unfortunately, our supply was exhausted before it was possible to supply each of the foremen with a copy. Such being the case, I am asking you to do whatever you can towards acquainting your foremen with the names and addresses of the forest fire wardens nearest to them. The list of fire wardens will be found in the report sent to you beginning at page 112.

Some of the men went to considerable trouble to acquaint their foremen with the names of the fire wardens and how they could be reached.

Unfortunately during the year a number of complaints have been received about various highway operations. A steam roller was the cause of a fire; careless employees are supposed to have caused a fire; complaints of brush cutting without proper removal of the same were received from Lycoming, Fulton, and Centre counties; township supervisors did the same thing in Clearfield and Mifflin counties; and in Clinton county one fire is reported as having been the result of careless burning of leaves along a State Highway by one of the foremen. In every case these complaints were referred to the State Highway Department, and assurances were made that proper steps would be taken to correct the trouble and that instructions would be issued so as to prevent the possibility of similar complaints in the future. In a number of cases, it is becoming a fixed rule that any material mowed or cut along a State Highway is burned at once. This is as it ought to be. Highways are something more than routes of travel. Anything that mars the beauty of a route is a detriment and must be eliminated. Railroads spend millions of dollars to beautify their rights of way and the State must pay some attention to the same idea. Weeds and brush should be removed for this reason alone, but when they become a menace to forest property, then there are additional reasons for their prompt removal.

We have also been supplied with county highway maps which have been of great assistance to us.

OTHER STATE DEPARTMENTS.—In a number of instances we have received assistance in notification of fires from deputy fire marshals. We should have some definite plan of co-operation with the State Fire Marshal and his deputies. The Geological Survey Com-

mission and the Water Supply Commission should be able to give us valuable help in the much needed forest map of the State, the beginning of which we were unable to accomplish this year. The Department of Education and the Department of Agriculture can aid us in making it possible to carry on educational activities in the schools and among farmers. Through the officials of State College, we have been promised the assistance of farm experts, especially in counties where there are only farm woodlots, and where we have few fire wardens. In fact, since forest fires affect all classes of people and all factors in which our government is interested, it should be a rule among all State employes to notify fire wardens promptly of any forest fires which come to their attention.

FIREMEN'S ASSOCIATION OF PENNSYLVANIA.—Early in 1916, as a result of our correspondence with them, the officials of this association promised their cooperation in the protection of forests from fire, if we could present a plan which could be agreed upon. Unfortunately, because of impossibility of completing the reorganization of forest fire wardens, and of putting into effect certain publicity measures, no plan satisfactory to us could be drafted. We trust, however, that something along this line may be accomplished soon, especially as there is a close association between the State Fire Marshal's Department and the firemen of the State.

U. S. DEPARTMENT OF AGRICULTURE.—This bureau has been very glad to supply the U. S. Bureau of Forestry with copies of all forest fire statistics and to supply any other information at hand when requested. The U. S. Bureau of Plant Industry furnished us with a card list of known white pine plantings within the State so that we could be of help in checking up the white pine blister rust. This list, in turn, was furnished by us to our own Economic Zoologist for the use of the blister rust inspectors working under his direction.

BELL TELEPHONE COMPANY OF PENNSYLVANIA.—The legal department of this company very gladly promised cooperation with us in the matter of eliminating fire hazards along their rights of way by seeing to it that their men burn carefully all brush and weeds mowed thereon, especially in forest regions. Other requests have been made upon the company which we hope to see materialize in the next year.

BOY SCOUTS OF AMERICA.—Because of the instructions which are being given to Boy Scouts constantly, they are a valuable aid to the Commonwealth in forest protection work. In a number of places, Pennsylvania foresters are scout masters, and a number of scout masters have been made forest fire wardens. The organization is assisting in practical ways and the results of the present training must surely mean greater regard for the forest when the scouts become men.

In Berks county, scouts have served as fire observers on high points, and as patrolmen. From Cambria county, an instance is reported as follows: The scout master is a fire warden and had a crew of men at a fire. He needed six more men. A scout was sent to a high point to send out the necessary message by International Morse Wig-Wag System with the hope that some scout near the city would catch the signal and get the men. The message was caught and in a very short time reinforcements were on their way to the fire.

In Johnstown, our District Forester was able to have a very important resolution passed upon by the City School Board. It is as follows:

Whereas, The Boy Scouts of America are actively engaged in rendering efficient help in preventing and suppressing forest fires and particularly in the vicinity of Johnstown, where official notice has been taken of the good work of the Johnstown Scouts in these words of the Chief Forest Fire Warden, George H. Wirt, Harrisburg, Pa. "I wish you would extend to the Boy Scouts of Johnstown my appreciation of their co-operation in the matter of notifying our wardens of the presence of forest fires and of any other assistance which they have rendered in extinction, etc."

Therefore, To aid in the suppression and extinction of forest fires, which annually destroy thousands of acres of timberland in Pennsylvania, causing an economic loss to labor each year of at least \$20,000,000 and making the water supply impure and uncertain, the School Board of the City of Johnstown, through the Superintendent of the City Schools, will co-operate with the Pennsylvania Department of Forestry in this way:

When a duly authorized forest fire warden of the Department of Forestry makes a request to the principal or teacher of the school which the scout or scouts asked for attend for the excuse of such scout or scouts for the purpose of preventing or extinguishing forest fires, such scout or scouts shall be excused from classes and other school exercises for a reasonable period, and shall receive credit for such absence it being understood that the Forest Fire Warden shall first summon the available men in the vicinity of the fire.

Approved September 18th, 1916.

School Board of the City of Johnstown,
J. N. Adee, Supt. City Schools.

Pennsylvania Department of Forestry,
Walter D. Ludwig, District Forester.

SPORTSMEN'S ORGANIZATIONS.—County and State Camps of sportsmen have endorsed our efforts to protect the forests and undoubtedly considerable good work has resulted from their activities. Reports from several counties in particular refer to the change in attitude of the people concerning forest fires as being due largely to the efforts of the sportsmen. Unfortunately notwithstanding the attitude of the better class of sportsmen, a large percentage of fall fires this year have been attributed to hunters.

The Meadville and Franklin Camps of the Wild Life League passed the following resolutions:

Whereas, five million acres of land within the Commonwealth of Pennsylvania is lying unproductive as a result of forest fires, and

Whereas, this repeated devastation of our woodlands by fire tends to render meaningless our efforts for the protection and propagation of game, fish, song and insectivorous birds in these regions, and

Whereas, an additional nine million acres in this Commonwealth is, by reason of lack of knowledge on the part of the owners, producing only a fraction of the value which it ought to produce, and

Whereas, this state of non-productivity or partial production results in a very material loss to every citizen of this Commonwealth; therefore be it

Resolved, that we, the members of Meadville Camp of the Wild Life League of Pennsylvania, do hereby pledge our hearty support to the work of the Pennsylvania Department of Forestry in its efforts to stop this devastation by fire and to render more productive all the forest lands within the Commonwealth, and further be it

Resolved, that we will require of each candidate for the legislature from this district a statement as to his position on the subject of forestry in Pennsylvania, and further be it

Resolved, that a copy of these resolutions be spread upon the minutes, and that they be referred to our magazine as official business for the consideration and action of each and every camp of the Wild Life League in Pennsylvania.

At the annual meeting of the Wild Life League, the following resolutions were presented and acted upon favorably:

No. 1. Resolved, That the work of the Pennsylvania Department of Forestry is fundamental and original; that it is the basis of the game and fish life of the Commonwealth; that all real recreation in the forest depends upon the preservation and restoration of a proper wood cover; that the forest is the preserver of the mountain streams and the nursery of the bird life of the State; and that it contains in itself the essentials for the conduct of the major activities of this League.—Approved.

No. 2. Resolved, Therefore, that the Department of Forestry should be consistently, regularly, and adequately supported by such appropriations of public money for use in the furtherance of its work as will enable it to accomplish the results it is capable of obtaining; that the appropriation for the protection of the forest lands of the State from fire and depredation should not be less than one cent per acre for the 7,500,000 acres of forest land to be protected, or a minimum amount of \$75,000 per year for this purpose; that the fund with which to purchase additional forest lands should be enormously augmented beyond what is now allowed for the purpose; that the pitiful and paltry appropriation of \$20,000 a year for the purchase of State Forest land is beneath the dignity of the Commonwealth of Pennsylvania, and that an amount not less than \$250,000 per year should be appropriated for this specific purpose; that the appropriation for the development and maintenance of State forests, to include the salaries and expenses of the trained men now in the employ of the Department earnestly engaged in this work, should be of such adequate size that the Department will not be compelled to discharge men, but that it may retain and equip its employees in a manner befitting the work in which they are engaged, pay the suitable remuneration, and accomplish the work of maintenance and development in orderly sequence that in the shortest possible time it may restore the barren lands of Pennsylvania, and particularly the State Forests, to a condition where they will support young growing crops of timber of good species which in the future will become enormously valuable, and a certain source of revenue for the public schools; that an appropriation for this purpose of \$500,000 per year should be gladly and willingly made by the Legislature and approved by the Governor at the coming session and that such minor appropriations as are necessary for conducting the work of the Department be made in accordance with the recommendations of the Commissioner of Forestry, all of which should be in adequate amount and for that work which is necessary and incidental to the main work of the Department.—Unanimously approved.

No. 3.—Resolved, Further, that the members of the Wild Life League use their utmost endeavor to arouse in the minds of the citizens of Pennsylvania a greater and deeper interest in forestry and direct their attention to the achievements which have already been attained by this Department, results far in excess of those in any other State and second only to the undertakings of the National Government.—Unanimously approved.

No. 4.—Resolved, Further, that the investment thus far made by the Commonwealth in the business of practical and scientific forestry should not be wasted nor permitted to be frittered away for want of that support so necessary and essential for the continuation of the business, and without which support moneys thus far spent will avail but little. Unanimously approved.

No. 5.—Resolved, Further, that the Wild Life League, as an organization, is committed to the proposition of adequate support for practical and scientific forestry in Pennsylvania, and that it will exert all its power in an endeavor to bring about the results above stated, believing them to be necessary and fundamental for the healthful continuation of a work having the widest possible usefulness in the economic life of the State. Unanimously approved.

The United Sportsmen of Pennsylvania also adopted a resolution with respect to forest fires at their annual meeting.

Forest fires. Resolved, That whereas, the forest is the basis of conservation generally, we call the attention of our legislators to the necessity of making provision for more adequate protection of forests from fire, and the employment of a suitable number of fire wardens with equipment to extinguish and prevent forest fires on all lands within the Commonwealth, either by suitable appropriation from the Treasury of the Commonwealth or by a system of taxation imposed on forest lands specially for such purposes. Also, That we recommend to the consideration of the legislators the plan of the Department of Forestry to ask an appropriation of one hundred and fifty thousand dollars for two years for the purpose of forest protection, this estimate to be based on one cent per acre per year for seven million, five hundred thousand acres.

Our fish, game and forestry departments. Resolved, That we commend the work of our Game Commission, our Department of Fisheries, and our Forestry Department during the past year, and that we renew our pledge to assist these departments in their work, and in the enforcement of their respective regulations.

RAILROADS.—Although it is still true that railroads are causing an unnecessary number of forest fires, and unduly holding up just claims for damages, yet it is also true that there has been an increase in railroad activities this year toward eliminating fire hazards and fire losses. Reports are being received to the effect that section men no longer have to be coaxed out to extinguish fires along railroads. Whether the fire started as a result of railroad operations or not, they are now at the scene of the fire as promptly as possible. Old engines have been discarded, and engine inspection has become more rigid. New equipment has been installed in order to lessen the possibility of sparks being cast out. Gasolene speeders are replacing the old hand car, and in several instances patrolmen have followed all trains in extremely dry weather. These conditions are not yet general, but are becoming more common. With very few exceptions during the year the railroads have not failed in the cooperation asked of them thus far.

On April 1, the following letter was sent to all railroad companies, and as a result definite instructions were issued to all employees on most of the roads:

Dear Sir: The maintenance of a forest cover upon our mountain lands has become one of the most important issues before the American public. To the railroad, especially, the preservation of the forest means:

1. A plentiful supply of ties, poles, and car lumber.
2. Freight, in the form of lumber and manufactured wood products.
3. Freight, in the form of supplies for lumber camps, sawmills, and manufacturing plants.
4. Good scenery, bringing in tourists and campers.
5. Hunting and fishing, which attract sportsmen to the regions forested.
6. Reduction of floods, droughts, and washouts, and expenses accompanying them.
7. Regulation and purification of water supply for shops and roadside water tanks.
8. Increased general freight through maintenance of general fertility of the farming region watered by the forest streams.

Forest fires which destroy not only present but future growth, strike at the very foundations of the welfare of the railroads of Pennsylvania.

During the year 1915 there were reported by our local forest fire wardens 1,101 forest fires. Of these, 274, burning over an area of 67,916 acres, are said to have been started by railroads. We feel that the number of fires can be appreciably

reduced by the exercise of proper precautions. Furthermore, we are certain that cooperation between the railroad employees and the various local fire wardens of this Department must result in a great reduction of the area burned over by those fires which do start in spite of all precautions.

This Department desires to cooperate with you in every possible way. The spring fire season usually opens in April, and at this time we ask for your cooperation in a prompt issuance of general orders to all employees with respect to this matter.

B. F. P. Circular letter 9.

On July 19th the following letter was sent out:

Dear Sir: In order that your Superintendents of Divisions, section men, and other officials interested in the matter, may have in their hands a list of the forest fire wardens of the State so that forest fires may be reported to the nearest warden promptly, I shall be very glad to have you specify, if you will, the names and addresses of persons to whom copies of list should be sent and the number of copies to each person.

As a result of prompt replies of the companies and their willingness to cooperate with us in reporting fires, more names were received than we had lists of wardens, consequently it became necessary for us to send out the following on September 6:

Dear Sir: Owing to the fact that we are short two thousand copies of our forest fire warden roster it is impossible to send the number of copies requested by you. Under separate cover there will be sent you one or more copies of the Report of the Chief Forest Fire Warden for 1915. As a part of this report you will find a list of forest fire wardens. This list is not correct as the force is just being reorganized. Those names, before which numbers are placed, are, with a few exceptions, correct, but many additional men have been appointed whose names do not appear and a great many of the other names should be removed.

A new roster will be available at the beginning of the year after the reorganization is completed and then we hope to be able to supply you with the number you have requested and more if you need them.

In a number of instances, railroad officials came to this office or wrote to us to get complete lists of wardens along their rights of way, and in other cases lists were sent from railroad headquarters to each division superintendent.

On September 13, the following letter was sent to all railroad companies, and responses have been had from all of the large companies and many of the smaller ones:

Dear Sir: The forest protection code of 1915, P. L. 797, authorizes the Chief Forest Fire Warden to draft reasonable regulations for the prevention and control of forest fires along railways within the State of Pennsylvania.

In order that such regulations may be reasonable and as practicable as possible it is desired that the Department of Forestry be furnished with copies of all rules and regulations which you now have in force relating to fires along your right of way, clearing of right of way, dumping of ashes, inspection and handling of engines so as to prevent the throwing out or dropping of live coals, fire reports and fire extinction, in fact any rules relating to this subject. We also desire copies of any forms used in connection with these instructions.

It is our desire to be helpful wherever we can, and, with this end in view, we shall be very glad to receive any suggestions bearing upon the prevention and extinction of forest fires.

B. F. P. Circular letter 13.

It was hoped that these regulations could be classified and unified during this year, but other work prevented. This work now remains to be done during the next year.

The following letter from forester Chas. R. Meek, Coburn, Centre county, dated May 27, 1916 explains two important propositions in connection with railroad fires, viz., the difficulty of definitely attaching the fire to railroad operations, and the value of removing fire hazards along rights of way:

Relative to the fire report of May 6th we think that train No. 194, engine 1663, by Cherry Run tower 10:55 A. M. set this fire. As to the fire of May 9th we think train No. 132, engine 403, by Cherry Run tower 3:32 P. M. set this fire.

We have only circumstantial evidence as to these fires. I do not think any one saw the spark come out of the stack and fall in the leaves and set fire, unless it was at night. However, in working along a railroad a train will pass a crew of section men and a few minutes afterward they will see a small fire burning and, of course, attribute it to the engine. In these two cases the trains passed as usual and a little while afterward the section men noticed smoke and upon investigating found fire near the right of way. Certainly it *could* have started from some other cause. It is very possible. However, the probabilities are that the engine set it. This, too, is very possible and also very probable.

The section men must report and fight all fires arising from or near the right of way. This report is taken up by the supervisor of the division and an examination is made of the engine in order to see if it is defective. Mr. W. V. Betts, Supervisor No. 15 of Lewisburg, told me that in nearly every case the engine is found to be O. K. and the fire unpreventable by the apparatus used, if the engine did start the fire. All cases are investigated and every engine setting fire is examined.

It seems that railroad fires are a necessary evil as long as coal is burned on the engines that are not equipped with spark arresters that stop every spark, and also, a matter of equal importance, equipped with an extra guard ash pan to catch live coals dropping from the pan and striking a tie and flying many feet from the track. The firemen should also be prohibited from kicking hot clinkers from a moving engine or for that matter from any engine in a wooded district. Why is it necessary at all?

Mr. Betts informs me that the trains on this road are now equipped with larger engines and they do not need to puff so hard in order to draw the loads. The section crews, on account of the hard grades, will soon be equipped with motor cars capable of a speed of 50 miles per hour and will soon bring men after a fire is reported. These railroad fires cost the railroad company an enormous amount of money to fight. They pay their own men and this spring at one fire, May 10-13, we had six crews of section men present, coming from Glen Iron and Centre Hall to Paddy Mountain on their hand cars. At one fire last year a work train of men was made up at Montandon and run to Cherry Run. It seems to me that it would pay better to put more money in prevention than in extinction of fires.

Speaking of prevention, it might be well at this time to report what we have been doing to prevent railroad fires. In 1915, up to May 6th, we had eleven railroad fires that were reported to me, burning over about 350 acres, costing the fire appropriation \$44.25, Forestry Department for forester's and ranger's time \$54.40, the cost to the railroad company being unknown, and doing an estimated damage of about \$500. This spring I got permission from numerous property owners along the right of way, including the Commonwealth, to burn a safety strip along the railroad varying in width from 20 feet to 100 feet wide. Nearly all owners allowed us to go ahead especially in the dangerous places. The railroad, nearly the entire distance through the woods here, has the mountain on one side covered with growth which is dangerous once it gets on fire. However, on the other side of the railroad, there is only a very narrow strip of growth until we meet Penns Creek about 100 feet wide. As there was little danger of a fire getting beyond control on the creek side, we decided to burn only on the mountain side of the railroad, except in one instance. I received permission from the Forestry Department to go ahead, and was allowed \$75. I then went to Lewisburg and talked the matter over with Mr. W. V. Betts, the railroad supervisor. He agreed that the plan was a good one and offered to give me three crews of section men to do the work. I went ahead and with my men cleaned and cut the path and then set the crews to burning. We have burned about eight miles on the one side of the track but we are not yet through, but we have gone about as far as we can this spring as the trees are about green and there is danger of killing too many.

We had fires this spring but in every case they started from places not yet burned, and in one case on the side of the railroad that we did not intend to burn. In the fall we expect to go ahead and finish the work and then repeat every year in the fall. No fire, while burning the strip, was allowed to get beyond control. (There may be one exception to this but we are not sure.) Even if a fire did get away and burn a few acres or even more, I would not have considered it a failure as our method undoubtedly prevented numerous fires, any one of which might have done many times that damage.

In 1916 we had five railroad fires, one unknown, but am sure it was fire of May 6th that broke out again but listed as unknown. They burned over 23 acres, damage \$26, cost Bureau of Forest Protection to extinguish \$17.55, Forestry Department for forester's and ranger's time \$24.90, cost to railroad company unknown. On May 6th we had a railroad fire and put it out, and we had two light rains, one on the 7th and one on the 8th. On the 10th, fire started at 7 P. M. on the top of the mountain at the edge of fire of May 6th. The cause of this fire is unknown but I think it arose from the fire of May 6th. It burned 55 acres, damage \$30, cost Protection Bureau, \$65.28, Forestry Department for Forester's and ranger's time \$18.00 to extinguish. We did not get this fire entirely out until the 13th as it broke out anew repeatedly and we had to keep sufficient men on hand all the time. The wind blew a gale. It is interesting to note that the railroad kept 31 men here for a total of 368 hours. We fed them when necessary.

Of course, no conclusions or comparisons can be drawn from these figures as we had a fire season up here that was quite wet and very unfavorable to fire danger. Comparisons are odious anyhow as conditions are so varied, and even with extreme caution and preventive measures, conditions will arise that will perhaps cause great fire damage in spite of everything and throw all figures, calculations, and prospects to the four winds. Last year we had a very dangerous fire season and I think we did well to have only eleven railroad fires with but 350 acres loss, while from other causes we had over 4000 acres loss in two fires, and very much greater damage per acre.

However, I still think our safety strip idea is a good one and one that we want to finish and continue. I think the railroad company and the property owners are to be commended, and if you think favorably of the idea, I can send you the names of those concerned and you could write them a letter thanking them, so that they know that even the people in Harrisburg have heard of their efforts and take interest in their undertakings.

Notwithstanding the difficulty in seeing the spark from an engine cause a fire, several companies have made their own investigations and when they have been satisfied that their engines were responsible for the fire, have promptly settled for damages and for fire extinction. There is no question but that this is the best policy for all railroads and we shall do everything we can to bring about an attitude which will result in prompt voluntary settlements.

OIL COMPANIES.—On July 26th, the following letter was sent to sixty or more oil and gas companies operating within the State:

Dear Sir: We are endeavoring to obtain the cooperation of various companies and individuals who are directly interested in the prevention and extinction of forest fires. If your company owns or controls an oil pipe line which extends through forest areas, it is to your interest that any fires which may occur be extinguished promptly.

This Department has under its direction a number of forest fire wardens whose duty it is to take steps immediately for the extinction of any forest fires which may arise. Our system of wardens is just about completely reorganized and a list of our fire wardens has just been published. A great many of the oil companies have patrolmen going back and forth along their pipe lines and it will be of considerable value to have these patrolmen know who the fire wardens are along their sections, and how they may be reached. We shall be very glad to send you, or to each of your patrolmen, a list of the fire wardens in the State if you will be kind enough to supply us with the names and addresses of persons to whom such list should be sent. With these lists in the hands of your employees, we shall be very glad, indeed, to have your cooperation in having any forest fires which may be discovered by any of your men reported promptly to the nearest fire warden.

Fourteen companies who employ pipe line walkers promised cooperation by having their men report fires to the nearest wardens.

PROTECTIVE ASSOCIATIONS.—The Department has continued its cooperation with the Pocono Protective Fire Association, the oldest association of its kind in the United States, and with the Central Pennsylvania Forest Fire Protective Association.

The Fourteenth Annual Report of the Secretary of the Pocono Association calls attention to the fact that the fire loss during the year is reduced considerably below that of previous years. Under the direction of the State District Forester there are twenty-nine forest fire wardens, and seven patrolmen during the dry seasons of the year. Attention is called to the need of additional patrolmen to cover the entire county of Monroe.

An effort was made to obtain an extension of telephone service within the county, but nothing could be done. The association built one mile of line to connect a tower at Cresco Heights.

"Forest protection has been aided by the distribution of warning posters throughout the county, and advertisements have been carried in the weekly newspapers, offering a reward of one hundred dollars for information leading to the arrest and conviction of any person who sets fire maliciously to woodlands."

Fifty-six new members joined the association during the year and a fair proportion of these were local land owners.

Arbor and Bird Day and other addresses were made by the secretary.

The fire wardens were entertained by a member of the Board of Directors.

A forestry exhibit was installed at the Barrett township fair.

Data for the Year Ending December 31, 1916.

RECEIPTS

Balance on hand, January 1st, 1916,	\$288 07
Assessments for previous years (arrears),	
Assessments for current year,	517 60
Contributions in cash (directly or indirectly),	268 83
Refunds from State,	674 53
Value of contributions in labor or material,	
	\$1,749 03

DISBURSEMENTS

Printing and stationery,	\$72 94
Postage,	38 50
Secretary-Treasurer allowance,	63 91
Travel, telephone and telegraph charges,	
Rewards for essays, etc.,	15 26
Towers and telephones,	69 42
Tools and equipment,	39 45
Patrolmen and observers,	1,090 50

Other outlay not itemized:

Wardens' meeting,	3 80
1,000 celluloid buttons,	14 30
Exhibit at Fair,	6 78
American Forestry Association,	3 50
Affidavits,	1 25

29 63

Rewards for convictions, \$1,419 61

Balance on hand December 31st, 1916, \$329 42

ASSETS

Cash on hand,	\$329 42
Unpaid assessments for current year,	20 00
Unpaid assessments for previous years,	
Telephone lines,	55 07
Tools and equipment,	36 75
Supplies,	
Refunds from State (due),	32 75
	\$473 99

LIABILITIES

Outstanding bills for year's expenses, None

Area of forested land within protected region,	140,000 acres
Area belonging to members upon which assessment is based,	21,000 acres
Rate of assessment per acre,	One cent
Number of members January 1st, 1916,	226
Number of new members added during year 1916,	44
Number of members on roll December 31st, 1916,	246

The Secretary of the Central Pennsylvania Forest Fire Protective Association reports that less than 1 per cent. of the area under supervision was burned this year. The loss by burning is the smallest in acreage and damage since the association has been operating. The average acreage per fire has decreased about 60 per cent., and the cost of extinction per acre was only 2.6 cents.

Six patrolmen and fourteen other fire wardens under the direction of one of the State foresters, who acts as secretary for the association, make up the protective force.

An extension of 1½ miles of telephone line was made to the 8½ miles already built.

About 45 miles of old roads and trails have been brushed out.

A fire break 5 miles long, 20 feet wide, was plowed, running parallel to the N. Y. C. Railroad. The space between the fire break and the right of way was burned.

The first annual meeting of fire wardens was held in March.

Special efforts were made to determine the cause of each fire. Out of 32 fires, the causes of all but four were definitely determined. All but four were preventable.

A large forest tree nursery was established by one of the members. Some tools were purchased but there is need for many more. Educational activities have included addresses before teachers' institutes, a forestry exhibit, posters, circulars, news items, etc.

Data for the Year Ending December 31, 1916.

RECEIPTS

Balance on hand,	\$31 43	
Assessments for the previous years (arrears),	45 00	
Assessments for current year,	357 89	
Contributions in cash (directly and indirectly),	116 96	
Refunds from State,	134 68	
Value of contributions in labor and material,	117 13	
		\$803 09

DISBURSEMENTS

Printing and stationery,	\$64 93	
Postage and affidavits,	12 15	
Travel expense,	76 05	
Towers and telephones,	119 40	
Tools and equipment,	45 10	
Patrolmen and observers,	112 75	
Dinners at wardens' meetings,	14 50	
Office rent,	39 00	\$483 88
		\$319 21

Balance on hand Dec. 31, 1916, \$319 21

ASSETS

Cash on hand,	\$319 21
Unpaid assessments for current year,	41 50
Unpaid assessments for previous years,	145 00
Towers and telephone lines,	456 24
Tools and equipment,	31 05
Supplies,	20 00
Refunds from State (due),	1 62
	\$1,014 62

LIABILITIES

Outstanding bills for year's expenses,	None
Area of forested land within protected region,	300,000
Area belonging to members upon which assessment is based,	89,039
Rate of assessment per acre,	.005
Number of members January 1st, 1916,	32
Number of new members added during the year 1916,	2
Number of members on roll December 31st, 1916,	34

During the year the Pocono and the Central Pennsylvania Associations have entered into agreements with the Department. The general form of agreement, slightly modified in unimportant particulars to meet local conditions, is as follows:

This Agreement of Co-operation made and entered into this.....day of, A. D. 1916, between the Commonwealth of Pennsylvania, acting through the Department of Forestry by Robert S. Conklin, Commissioner of Forestry, of the first part, hereinafter referred to as the Department and the Association, a private voluntary agency or association in Luzerne county, Pennsylvania, having its principal office at, said county, of the second part, hereinafter referred to as the Association,

Witnesseth that, Whereas, by reason of an act of the general assembly of the Commonwealth of Pennsylvania approved the third day of June, A. D. 1915, P. L. 797, it is provided, *inter alia*, that the Chief Forest Fire Warden, with the consent of the Commissioner of Forestry, may enter into agreements with persons, firms, corporations, or associations, upon satisfactory terms, for the successful accomplishment of forest fire prevention or control (page 798, paragraph j); and

Whereas, by a further act of assembly approved the fourth day of June, A. D. 1915, P. L. 815, the Department is authorized to expend from its general forest fire appropriation for such protective and preventive purposes as it deems effective, a sum of money equal in amount to the amount which shall be expended by such agencies in accordance with agreements which may be entered into; which expenditures must be shown in monthly statements, to be audited and transmitted by the Commissioner of Forestry to the Auditor General who is then directed to draw his warrant for one-half of the amount of the expenditures shown in such monthly statement approved by the Commissioner of Forestry; and

Whereas, in the application and administration of said latter act of assembly it will be understood in any agreement to be made with such agencies, that said monthly statements required by law shall exhibit the expenditures which shall have actually been made by the co-operating agency and not sums which the Department by lawful authority may expend directly for the purpose therein provided; but which direct expenditure by the Department shall nevertheless be comprehended in and accounted for as a part of the equal amount which the Department is authorized to expend to meet the like equal amount expended by the association.

Now, therefore, in consideration of the foregoing and the sum of one dollar (\$1.00) lawful money of the United States in hand paid to the Department by the Association at and before the sealing and delivery hereof, the receipt of which is hereby acknowledged, and in further consideration of the mutual benefits to be derived by the parties hereto in the exercise of the authority conferred by said acts of assembly, it is mutually agreed:

1. That the Association is a private agency whose activities in whole or in part are directed toward the prevention and suppression of forest fires.

2. That the Department will expend for and in behalf of the purpose for which said association exists, a sum of money from its general forest fire appropriation equal to that which shall be expended by the association for the purpose mentioned in the said acts of assembly.

3. Said expenditures by the Department shall be made in the following manner: That when the monthly statements of the Association are received, audited, and approved, the Department will request the Auditor General to draw his warrant in behalf of the Association for an amount equal to one-half of the expenditure shown by the statement, and approved as aforesaid.

4. That when the Department shall make expenditures directly for the purpose of the association and in furtherance of this agreement, said expenditures shall be taken into consideration in calculating the equal amount which the Department shall expend to meet the expenditure of the association.

5. That the Association shall render to the Department at the end of each calendar year a complete report exhibiting an itemized statement of all its expenditures for that year, duly verified by affidavit.

6. All expenditures of money made by the Association and reported in its monthly statement shall be accompanied by proper signed vouchers or receipts.

7. The expenses which may be incurred by the Association may include the following:

- a All expenses incurred in the actual extinction of forest fires.
- b The salaries of patrolmen or watchmen when their employment shall have been ordered or approved by the Department.
- c The expenses of patrolmen or watchmen when necessarily incurred in the performance of their duty under their employment as patrolmen or watchmen.
- d Expense incurred for the purchase of permanent forest fire fighting equipment which said equipment shall be accounted for by inventory in the annual report to be submitted at the end of the calendar year.

e Expense incurred in the building and equipment of telephone lines when said expenditure shall have been previously approved by the department.

f Expense incurred in the building and equipment of fire towers or observation lookouts when said expenditures shall have been previously approved by the Department.

g Expense incurred in the making and maintenance of fire line or fire breaks when they shall have been established under the direction of the Department.

h Expense incurred for educational activity which shall have immediate and direct reference to and connection with forest fire extinction, prevention, and control.

8. It is understood and agreed that other expenditures not herein specifically enumerated but which are immediately and directly made for forest fire extinction, prevention, or control, shall be regarded as legitimate expenditures of the association to be accounted for as aforesaid, provided that expenditures made in the giving of prizes for essays or competitions which shall be undertaken among school children or other groups of persons, in relation to the activities of the Association or the general subject of forest fires in its various ramifications, shall not be regarded as coming within the meaning of the foregoing acts of assembly or of this agreement.

9. It is contemplated that the funds raised by the association for the purpose for which it exists shall be derived from ratable assessments levied upon its constituent membership in accordance with the rules of the association, gifts of money made outright by friends of the association or its individual members, or from any other legitimate source from which money may be derived.

10. If at any time any of the constituent members of the association shall on its or their own account develop for personal private purposes a system of forest fire extinction, prevention, or control, the expenses of such constituent member or members so privately incurred shall not be regarded as a part of the expenditures of the association to be accounted for as aforesaid, or to be paid in part by the Department.

11. The expense of the Association shall be rendered upon blank forms to be furnished for this purpose by the Department and such statements must be submitted monthly. No expense incurred more than sixty days prior to the date of receipt of the statement by the Department shall be paid, as such payment is expressly excluded by law.

12. The annual report to be rendered at the end of the calendar year shall show *in extenso* every expenditure fully itemized which shall have been made by the Association for the purpose contemplated by this agreement. It shall show the source and amount of revenue obtained by the association, the value of the material purchased, or material or labor furnished in lieu of money by members of the association, or other assets of the association which it shall have acquired from time to time. The financial statement accompanying the annual report shall be made in accordance with an outline to be furnished by the Department.

13. Said annual report shall likewise exhibit a complete resume of all the work done by the association during the year. This is to include a statement of the total area covered by the protective measures of the association, the actual area owned or controlled by its constituent members and such other facts in relation thereto as shall clearly set forth the activities of the association for that year.

14. The association shall require its patrolmen or watchmen whether they be employed jointly by the Department and the association, or employed by the Department in furtherance of the purposes of the association, to make a daily record of their actions and observations, which said record shall be submitted by the association to the Department along with its monthly statement and upon a blank form to be supplied by the Department.

15. The association obligates itself to the Department to extend its protective influence and effort over as large an area as possible, and from time to time bring in as a part of its constituent membership such additional owners or controllers of land as it may induce to join and participate, the purpose of this activity being that the expenditure of money on the part of the Department shall be made for the purpose of diffusing the activities of the parties hereto over as large a forest area as possible in the region where the association shall conduct its affairs.

16. In case the subsisting forest fire appropriation allowed the Department shall be exhausted prior to the end of the appropriation period and the Department be unable to pay its ratable proportion of expenses to be submitted for payment by the association, this agreement to such extent shall be in suspension and abeyance, and the Department will use its best endeavors to procure a deficiency appropriation from the ensuing legislature with which to discharge such unpaid obligations.

17. By consent of the parties hereto this agreement shall continue in force until the first of June, A. D. 1917, and may be extended, modified, or enlarged in case only that the parties hereto shall mutually consent to the same.

In Witness Whereof the party of the first part has executed these presents by attaching hereto the seal of the Department of Forestry, and the party of the second part, in pursuance of a resolution of the Board of Directors of said association, duly adopted on the day of, 1916, has caused the same to be executed by its proper officers duly attested.

Signed, sealed, and delivered in the presence of us: The Commonwealth of Pennsylvania Acting through the Department of Forestry.

By
Commissioner of Forestry.

..... Association,
By
President.

Attest:
Secretary.

Largely through the efforts of District Forester R. Lynn Emerick, it was possible to present the subject of forest fire prevention to some of the timber land owners of McKean county. A meeting was arranged for and on the evening of September 8th the Chief Forest Fire Warden presented the matter to fifteen men. The work of the Department was set forth and the advantages of organization for forest protection purposes. A temporary organization was formed that evening, with Mr. Jos. Diem, Temporary Chairman, and Mr. C. H. Messerly, Temporary Secretary. A membership campaign was started at once.

On the evening of October 27th, a meeting was called to complete a permanent organization. As it was impossible for the Chief Forest Fire Warden to be present, he sent the following letter to be read:

There is no question as to the necessity for protecting forests from fire, from any of the following standpoints.

1st. From the standpoint of the land owner himself who wants, or should want, his land to yield him the highest possible returns. These returns may be in general timber production or timber to meet some of his own peculiar needs. His timberland may be a protection to his home buildings, fields, or stock, or it may yield him some returns purely and simply because of its being the home of game or because it furnishes him some other personal enjoyment.

2nd. From the standpoint of the farmer, forest protection in his immediate locality and upon the water shed generally, within which his farm may be located, is a necessity because of the beneficial influence which well cared for forests exert upon local moisture conditions both in the atmosphere and in the soil, and because of the fact that forest fires do more to destroy insect eating birds than all of the other natural destructive agencies put together.

3rd. From the standpoint of the manufacturer who uses wood products as raw material, and of the wood user whoever he may be, forest protection from fire is of great importance because of the fact that fire is the greatest influence being exerted upon timber prices, the effect of which is to force the price constantly higher and higher.

4th. From the standpoint of any individual who is interested directly or indirectly in water power, forest fire prevention is a necessity because there is no other natural force which exerts so great a beneficial influence upon the regulation of stream flow as a well preserved forest under which there is a well developed forest litter.

5th. Every individual who is interested in a pure water supply, either for himself or for his own community or for other communities in which he is interested, must realize the importance of the prevention of forest fires because there is no other natural factor which acts so beneficially in the storing of rainfall, in its purification, and in furnishing a regular supply of potable water.

6th. From the standpoint of the sportsman, forest fire prevention is necessary because forest fires do more to destroy the game of a region than all of the hunters put together.

7th. From the standpoint of the tourist who desires to travel through beautiful mountain scenery, forest fires must be suppressed. They leave in their wake nothing but desolation. And it may be stated here that Chambers of Commerce and other bodies interested in bringing money into their communities may do well to look to the tourist trade as a ready means of attracting much money into the lines of business represented in their communities.

There are many other classes of people who might be mentioned that may be seriously affected, directly or indirectly, by the results of forest fires, especially the laboring man, and from these smaller groups we may go immediately to community groups, township, county, and the Commonwealth. The individual timber land owner is not the only one by any means who benefits by forest protection and proper forest management or who suffers as a result of forest fire and bad management. The Commonwealth of Pennsylvania for years has recognized these facts and has made various efforts to assist the individual in the protection of his forests from fire. Unfortunately, these efforts, in the main, have not been successful. We have had law after law in the statute books, but without the backing of public opinion and without a proper enforcement of the law where it might have been enforced, practically nothing was done. Even now when a satisfactory law is in effect and an effort is made to carry it out, the Commonwealth has not contributed a sufficient amount of money to make possible forest protection as it should be carried on, and it is a very large question, indeed, whether the Commonwealth ever will contribute enough money to entirely eliminate this tremendous curse which hovers over its welfare. There are certain considerations in the question of forest protection which prompt us to believe that because of the individual benefits received, the owner himself should be induced to do something for his own protection, also that the Commonwealth should do something for the protection and the benefits which it receives, and further, because individual protection is practically impossible of accomplishment without the co-operation of adjoining land owners, we believe that the best results can be obtained through the organization of a co-operative protective association made up of timber land owners and others in various communities interested in the protection of the forests. This association will, to a very large extent, work out its own protective measures, and because of the personal interest which each member has in the activities of the association, the expenditure of money undoubtedly will be most carefully supervised and a dollar's worth of returns will be expected for each dollar expended. Through such an association the Commonwealth is willing to contribute its share for the protection of forests within the region covered by the association's activities, and the expenditure of the State's money may be made by the directors of that association or their proper agents.

The activities of such an association, of course, largely would be in accordance with plans that have been approved by the officials of the State Department of Forestry. This does not mean, however, that the association could not carry into effect any measures which were not approved by the State officials. It simply means that for all expenses approved by the Department of Forestry, the association would be reimbursed for an amount up to 50 per cent. of the total. As for example, if the association, with the approval of the Department of Forestry, thought it necessary to employ five patrolmen during the spring fire season at an expense of \$500, the association through its officers would recommend the men who were to be employed and the salaries which were to be paid, and to a large extent would determine the region over which each patrolman was expected to travel. The Department of Forestry would ask the patrolmen to make certain reports and to perform the duties of a forest fire warden as now provided by law, and as such, of course, would come directly under the supervision of this Department. Such supervision in McKean county has been carried out under the direction of Mr. R. L. Emerick, of Coudersport, who is our district forester for Potter and McKean counties. Upon presentation to the Department covering expenditure for salaries of the patrolmen, the Commonwealth would reimburse the association to the amount of \$250 which would, of course, go into the association treasury and would be available for subsequent expenditures.

The value of the association, then, may be stated about as follows:

1st. It brings together the people of a community who are largely interested in forest fire prevention.

2nd. It makes possible a better protection of the forest within a definite region because of a better system than can be worked out by individuals scattered here and there over the territory.

3rd. It makes possible a greater return for the money expended by the individuals themselves.

4th. It makes possible a means for local education against forest fires which is more effective than any system of education which might be conducted from the State Department. In other words, such an association will create local public opinion which will be against forest fires and for the enforcement of laws relating to forest protection.

5th. It makes it possible for the State to do its duty to local forests which under other circumstances it simply could not do because of lack of appropriation, and because of a lack of means to create the necessary public opinion for proper forest protection.

Finally, it means the actual elimination of forest fires, a thing which is practically impossible without organization and co-operation either on the part of individuals themselves or by the Commonwealth itself.

Mr. Emerick was present and cleared up many questions which arose.

Mr. Diem and Mr. Messerly were elected President and Secretary respectively. The organization is to be known as the McKean County Protective Fire Association. The constitution and by-laws adopted were substantially the same as those of the Pocono Association.

The Secretary's report follows:

Data for Year Ending December 31, 1916.

RECEIPTS			
Assessments and dues for current year,	\$102 49		
Refunds from State,	17 04		
			\$119 53
DISBURSEMENTS			
Printing and stationery,	\$24 12		
Postage,	13 00		
Secretary-Treasurer allowance,	20 00		
Affidavits,	50		\$57 02
Balance on hand December 31st, 1916,			\$61 91
ASSETS			
Cash on hand,	\$61 91		
Unpaid assessments for current year and dues,	32 06 Plus		
Refunds from State (due),	11 77		
			\$106 34
LIABILITIES			
Outstanding bills for year's expenses,			None
Area of forested land within protected region,			?
Area belonging to members upon which assessment is based,	11,056 Plus		
Rate of assessment per acre,	One cent		
Number of new members added during year 1916,	26		
Numbers of members on roll December 31st, 1916,	26		

By the word "Plus" is meant that some of the members have not to this date given in their acreage upon which to base assessment.

As a result of several inquiries as to the possibilities of individual corporations co-operating with the Department for a better protection of their forests from fire, a meeting was called at Hazleton on September 29th. Representatives of eighteen companies owning timber land were present. The Chief Forest Fire Warden stated the purpose of the meeting and set forth some of the reasons for organized efforts against forest fires in the anthracite region. Dr. W. R. Fisher, Secretary of the Pocono Protective Fire Association, spoke of the work which his association has been doing in Monroe county. Dr. H. S. Drinker, President of Lehigh University, spoke of the necessity of forest protection. Hon. I. C. Williams, Deputy Commissioner of Forestry, spoke of the importance of a local organization in educational work and other protective activities. Those present expressed their various opinions as to the necessity for and the importance of fire prevention. Mr. H. C. Wiener, Forester for the Lehigh Valley Coal Company, acted as temporary secretary of the meeting.

A resolution was passed to the effect that the Chief Forest Fire Warden appoint a committee to draw up a report setting forth the present conditions of the region, what ought to be done, etc., which report should be presented to a subsequent meeting and then submitted to corporation officials and other timber land owners.

The committee consisted of:

Dr. Henry S. Drinker, President of Lehigh University.

L. W. Conrad, Supt. Timber Dept., Reading Coal & Iron Co.

A. C. Neumuller, Forester, Lehigh Coal & Navigation Co.

H. C. Wiener, Forester, Lehigh Valley Coal Co.

James E. McNeal, District Forester, Pennsylvania Department of Forestry.

George H. Wirt, Chief Forest Fire Warden.

An outline for a report, and later a detailed report, was drawn up and submitted to each of the other members of the committee.

The committee met at Reading in the office of James E. McNeal, December 29th, to consider the report. It was approved, except that certain additions was requested. These changes will be made and a meeting called for a temporary organization early in 1917.

PUBLICITY

We believe that the solution of the forest fire problem in Pennsylvania is in a constant and vigorous campaign of education upon the subject. The Commissioner of Dominion Parks, Canada, states:

For practical purposes there are only two kinds of fires—man-caused and those resulting from lightning. The latter we cannot prevent but in regard to the former there does not appear to be any good reason why a great deal cannot be accomplished. I do not admit that one fire in 10,000 is started maliciously. Practically all are caused through ignorance and carelessness. It is the old story, "I didn't know it was loaded." The obvious course to follow then is to endeavor to educate every man who may by any chance go through the woods to guard against doing anything which may start a fire.

People have been educated to recognize the necessity of pure air; people have been educated to suffer the isolation of their loved ones in cases of contagious disease. Surely there is no reason why they should not also be educated to be careful in regard to forest fires.

I think those who have studied the psychology of it, agree that men are influenced most by affirmation and reiteration. If a statement is affirmed vigorously enough and reiterated often enough practically all men finally accept. There is no better vindication of this fact than the methods and the success of patent medicine men. You all know how they affirm and reiterate. Just think of the influence their campaign has on everyone of us. There is scarcely a man present, I will venture to affirm, who talking ordinarily with contempt for patent medicines, has not on occasions when he found himself pale or out of sorts, gone to a drug store and purchased some remedy that he has seen blazoned in the newspapers and on the bill boards as being good for pale people. It is simply a case of the efficacy of affirmation and reiteration.

It has been our policy this year to reach a number of classes of people directly interested in fire prevention. Circulars have been sent to our wardens, to game protectors, to timber cutters, to railroad companies, to dealers in sporting goods, to ammunition manufacturers, and to pipe line companies.

Forest fire wardens, game protectors, and dealers in sporting goods, and others have distributed our forest fire literature. There were distributed during the year.

About 156,000 forest fire stickers.

About 60,000 Forest Fire Facts (a two-page circular).

About 56,000 Carelessness vs. Good Citizenship (four-page circular).

About 60,000 four-page circular for school children.

There were also distributed 3,000 copies of the First Report of the Chief Forest Fire Warden, being a report on forest fires in Pennsylvania for the year 1915. Five thousand copies had been ordered. The mistake in number printed and the fact that they were not received until July 14th, after the spring fire season, prevented the possibility of doing some good publicity work at a proper season.

Whenever a forest fire warden has given definite information as to the cause of a fire, the individual or company responsible has been written to. To persons whose land is reported as having been damaged, the following form has been mailed:

Dear Sir

Our forest fire warden, has notified us that on a forest fire burned in township, county. He is informed that your woodland has been damaged.

The Department of Forestry is doing its best to suppress forest fires and needs the support and co-operation of every timberland owner. If you can furnish information as to the cause of this fire, sufficient to bring to justice the one responsible for it, the Department will refer the matter to the Attorney General for legal action. Conviction cannot be obtained on anything but exact statements of fact. If you and your neighbors will help us we believe we can make your woodlands one of the safest and most profitable of your investments.

B. F. P. Form 6

On the address side of this card appears the following cut, which was copied from a poster published by the Western Forestry and Conservation Association of Portland, Oregon.



News items have been given to papers by our wardens and seventy-six news items relating to forest fires have been sent out by the Department Bureau of Publicity. County lists of wardens were published in newspapers previous to the fall fire season.

Various reports, papers, and addresses have been prepared, a list of which may be found elsewhere. The foresters of the Department have done a great amount of work of this kind, and in a number of instances local fire wardens have made addresses before the schools of their neighborhood.

Through the efforts of the Department Bureau of Publicity, in charge of forester N. R. McNaughton, arrangements were made whereby we could have a motion picture film entitled "The Curse of the Forest."

"This two-reel motion picture of a forest fire that actually burned was taken in May on the Mont Alto State Forest by the Department of Forestry in co-operation with the Vitagraph Company of America. The scenario was written by two of the State foresters, all the actors in the picture, with one exception, are men of the Pennsylvania Forest Service, and every scene of the picture but one office scene was staged by the Department in Pennsylvania. Not an inch of the two reels is faked.

"The picture is a story of forest protection in Pennsylvania as it is and as it might be. The first part shows present Pennsylvania conditions. The picture opens with a lone ranger in a high tree-top, looking over a vast forest area in fire season. Rangers are few, and no money is available for modern steel towers, so the ranger adds to his effectiveness as much as he can by using high trees for observatories. While the ranger is in the tree a camper some distance away breaks camp and starts for home. He does not extinguish his camp fire properly, and, to make assurance doubly sure, he throws his cigarette butt into the dry leaves and passes serenely out of the story. But his work goes on just the same. The camp fire spreads, the cigarette does its duty nobly, and in a few minutes half a mountain side is blazing. The ranger sees the smoke, and, hoping that he can handle the situation alone, goes to the fire but finds it far too much for one man. And he is five miles from the nearest help and there are no telephone lines! He runs to the forester's office, a rough shack at the edge of the settlement, and arrives exhausted. The forester hurries out for help, and, in the course of an hour more manages to get five men. With this inadequate crew, and with scarcely any tools but axes, they start for the fire, now a raging conflagration, with a single team and over the roughest of mountain roads. They realize that the hours between the time the fire started and the time of their arrival on

the scene have given it a tremendous advantage, but they attack it gamely nevertheless. Time and again they win a little ground only to lose it because they are too few to guard what they have gained. The fire sweeps past their defenses time after time, and they are forced to fall back and start all over. After three days of the severest and most disheartening kind of work rain mercifully puts an end to the fire,—after half a township has been devastated.

"The second part is a picturization of the modern fire-fighting system Pennsylvania might have. Money makes the difference. The picture opens with a ranger on a steel tower equipped with a telephone. The camper has been educated to be careful with fire in the woods. He extinguishes his fire properly, and empties his pipe ashes in damp mineral soil. But accidents will happen, and sparks from a burning house in the forest start a fire. With his binoculars the ranger sees it almost at once, and telephones its direction to the forester. Reports are received from the other rangers, and the fire is located at the forester's office without the stirring of a foot. Help is summoned at once by telephone, and in little more time than it takes to tell it twenty men are on their way to the fire on horseback and in automobiles, equipped with modern tools. The roads they traverse have been transformed into real highways, and as a result of efficient methods all along the line the men arrive at the fire while it is still small. Because of their adequate equipment and number there are no "flarebacks" at this time, and in a very few hours the fire is over and the men are on their way home. And the final contrast is that only twenty acres are burned instead of several thousand.

"Many exciting incidents occurred while the picture was being taken. A miniature whirlwind came up a few minutes after the fire started, and the flames traveled over the tops of the pines in the nearest approach to a crown fire the South Mountains have seen for many years. Several of the men had narrow escapes, and one, who was forced to run through the flames, was unconscious for several hours. The camera man, in an effort to get a near view of the fire from a wagon, was almost encircled by flames, and was forced to run for his life. He succeeded in getting a "close-up" of a narrow escape of part of the fighting crew."

We have more requests for the film than can be filled and already it is wearing out rapidly. Several copies should have been had at first. A rare production will be lost forever if efforts are not made immediately to have some sort of duplication of it made.

Just before the end of the year, 2,500 copies of a poster setting forth the main points in the forest fire law were printed. These will be sent out to post offices early in the coming year.

The following circular letters were sent to all State foresters:

B. F. P. Circular letter No. 7.

March 6, 1916.

To All Foresters:

Fire Rakes.—Please notify this Bureau how many 4 or 6 tooth rakes you can use.

Fire Torches.—Please notify this Bureau how many pipe torches you need. The torches are about 3.5 feet long, weight 7 pounds, and will burn for seven or eight hours. Kerosene and lard oil, mixed, is the fuel used.

Publicity.—Whenever a fire occurs in your locality, send information promptly to all county papers, giving, if possible, the cause and the approximate damage, as well as any local items of interest. In case of a fire of any size, send description at once to N. R. McNaughton.

Meeting of Fire Wardens.—Rangers may attend any of these meetings, but if they do so, it must be at their own expense for the present.

Telephone Exchanges and Directories.—Get your county list of fire wardens posted at all telephone exchanges in your region and induce wardens who have telephones to have "fire warden" printed after their names in the telephone directory.

Fire Bills.—In case of small fires, where immediate payment is not called for, fire bills may be held to the end of the month. In other cases, forward bills without delay.

Expenses incurred in connection with forest fire business should always be kept separate for each county concerned.

Fire Report.—On the report (Form 15) of a fire at which a forester or rangers spend some time, always enter the amount charged for such time, at their fixed salary service rates so that we may have a complete record of what it costs to extinguish the fire. Give cost of extinction to private individuals or corporations whenever you can.

Duplicate copies.—In accordance with the rule to keep copies of every bill or report sent from your office, do so in the case of fire bills and reports. Identify all papers with your name and date.

Payment of Fire Bills.—If you can arrange satisfactorily with forest fire wardens, have them submit facts to you and you make up the bills and reports in your name. It is preferred, however, that each fire warden who has directed the extinction of a fire make up his bills and reports in his own name. His bills and reports will be submitted by him to the forester. The forester will audit them and if correct, approve them and forward them to Harrisburg. The fire check will be made out in the name of the fire warden and forwarded to him through the forester. The forester can arrange to have the check endorsed to him by the forest fire warden and can make up the individual checks, to be distributed by the fire warden. Use whatever method is most satisfactory for your conditions.

The forester is the head of the fire service in the region where he is stationed. He must at all times impress this fact upon those with whom he has to deal.

Fire Hazards.—Make a study of the fire hazards upon your own forest and in the adjoining country. Determine the relative degree of risk, how hazards may be reduced, and report to this Bureau. Do not limit your reports to your own district. Whenever you observe any unsatisfactory condition anywhere in the State, report the matter at once. Reports should be accompanied by sketches or maps.

Cause of Fires.—Information concerning the cause of each forest fire should be obtained in detail as far as possible, giving name and address of person or agency responsible, names and addresses of witnesses, what facts each may be expected to swear to upon the witness stand, and anything else that may be of value in preparing a case for prosecution. We must have STATEMENTS OF FACT and not inferences or suppositions.

B. F. P. Circular letter No. 12.

September 1, 1916.

To All Foresters:

Do you have copies of any county maps issued by the State Highway Department? If you have, indicate the county or counties. If you need such maps, indicate by county what you want. Forward your reply on the inclosed card at once.

The fall fire season will soon be here and it is important that all your equipment be gotten in shape and available for immediate use. Get in touch with as many of your fire wardens as you can and keep them alive to the necessity of prompt action. Have your own local organization worked out and get the fire wardens to follow your example.

Encourage co-operation for fire prevention and extinction wherever you can. If you have any forest fire literature, use it. If you want more, let us know.

Suggestions for the betterment of the service are always in order—let us have them. We desire in particular a lot of good suggestions for insertion in a Forest Fire Wardens' Manual. You have fought a number of fires. Make diagrams of the fires, indicating as well as possible topography, and wind. Show how you attacked them successfully or unsuccessfully. Make such diagrams, if possible, for all subsequent fires and submit them with your fire report. In this way we ought to get some valuable information.

B. F. P. Circular letter No. 17.

December 22, 1916.

To All Foresters:

Inclosed is a copy of a poster which we are permitted to place in the post offices of the State. With the aid of your Smull's Handbook, make a list of the post offices in the protective region which you control. Under each post office list the fire wardens who get their mail there or who will control fires which may be observed by persons getting their mail there. If there are post offices lying in another forester's territory whose patrons can notify your wardens, please include these in your list. We will eliminate duplications in this office.

We desire to have these lists just as soon after January first as possible. All lists should be in this office before January 20, 1917.

The following circular letters were sent to all forest fire wardens, including foresters:

B. F. P. Circular letter 6.

February 1, 1916.

Forest fire wardens should note the following items:

1. Bills (Form 16) must reach Harrisburg WITHIN 60 DAYS after they have been incurred or they will not be paid.
2. Bills (Form 16), receipts, and reports (Form 15) must be written in ink or upon a typewriter. Typewritten bills (Form 16) should be submitted in duplicate.
3. Receipts must be made out in your name and signed by the person rendering service.
4. Amounts for which receipts are obtained must be placed upon the forest fire bill (Form 16) before it is totaled.
5. No amount exceeding 25 cents will be approved for an affidavit fee.
6. Wardens who have received certificates of appointment are entitled to 30 cents per hour. Those who have not received such certificates are entitled to 25 cents per hour in the case of district wardens, and 20 cents for assistant wardens.
7. Employees may be paid not in excess of 15 cents per hour.
8. In computing amounts due a man, no fraction of a cent should be placed in the amount column. An extra cent should be allowed in case of $\frac{1}{2}$ of a cent or more. Anything less than $\frac{1}{2}$ cent should be dropped.
9. On each report (Form 15), you should divide your time charged into two parts: the time you spend fighting fire, and the time charged for other work in connection with that fire.
10. A separate report (Form 15) should be submitted for each fire that comes to your attention, no matter how small, whether you have been present or not, and whether there has been any expense to the State or not. We are anxious to get complete and accurate reports.
11. If more than one warden attend the same fire, you should consult with each other, and decide which one should make up the bill (Form 16) and report (Form 15), making sure that the warden who submits the bill and report has all the information necessary from the other warden.
12. If a State forester is at a fire, State forest rangers and forest fire wardens should report all matters to him and he should make out the fire bill (Form 16) and report (Form 15).
13. In case a State forester is not at a fire upon his forest or in his neighborhood and it is extinguished by a ranger or a fire warden, the report (Form 15) should be made out by the ranger or fire warden in attendance. The information necessary for making up the bill (Form 16) should be given to the State forester and the bill be made out by him.
14. When a fire has burned in more than one county, the acreage, loss, and expense should be apportioned between the counties. A separate report (Form 15) should be made for each county.

15. Expenses for more than one fire may be combined in one bill (Form 16), but those for each fire should be kept separate according to date, entering the earliest fire first upon the form. In this way, time and expense in making affidavits may be saved. Do not overlook item No. 1.

16. You should caution those whom you meet against the careless use of fire.

17. The people of your community should be kept informed as to the fact that you are a forest fire warden. Ask the rural mail carrier to notify you when he knows of forest fires. It is a part of his duty to do so. Those who use printed stationery, bill heads, etc., should have their title of forest fire warden included in the printing.

18. Employees must be paid by check as the law requires.

19. Employees should be notified to call for their checks, or the checks should be sent by mail when it would otherwise require extra time of the fire warden to deliver them.

20. Individuals extinguishing forest fire without first having been called upon by a fire warden, should submit their claims to the warden WITHIN ONE MONTH.

21. Forest fire wardens located along the border of the State should always make special mention of the fact when fires originate in the adjoining State and burn across the line into Pennsylvania.

22. Estimates of the area burned over and damage done must be more nearly accurate than they have been in the past.

23. This Department should be kept informed of changes of location, post office address, or telephone number, affecting fire wardens. When you are unable to attend to your duties, the Department should be notified promptly.

24. In correspondence with this office, you should always write your title after your name and then give the township and county for which you are listed.

25. You should send to this Department newspaper clippings coming to your notice upon the following subjects: forest fires, forest destruction, floods, droughts, failure of water supply, and any other matter closely related thereto, occurring within Pennsylvania. On clippings sent in, give name of paper from which taken, and date of issue.

26. Foresters should always stamp bills and reports coming through them with their "approval" stamp and countersign them.

27. On the back of your report (Form 15) draw a rough sketch of the township or townships in which the fire occurred, showing approximately the location of the fire.

28. A report on forest fires in Pennsylvania will soon be published. When you get a copy read it, and if you know of others who would read it, send us their names.

September 26, 1916.

To All Forest Fire Wardens.

By the time this letter reaches you the FALL FIRE SEASON will be on, and the following suggestions should be noted carefully.

1. Inclosed are copies of circulars now available. Wide distribution of this literature is desirable. If you can use any to advantage, write us giving title and number desired. Circulars may be posted at various places, or distributed to sportsmen, school children, and others.

2. We have received promises of co-operation from the following: Game wardens; fish wardens; and sportsmen generally; State Highway engineers, superintendents, foremen, and patrolmen; railroad men; pipe line walkers; oil and gas men; rural mail carriers; and Boy Scouts. Help these people to co-operate with us by making yourself known to them and ask them kindly to report fires to you as soon as possible. Get in touch with telephone centrals and ask them to call you promptly when forest fires are to be reported.

3. Don't fail to organize a local forest fire crew in each danger section if it is possible. See from two to ten good men and have it understood that they will go immediately when a fire comes to their attention.

4. Send bills and reports promptly. Don't forget that bills cannot be paid if received after 60 days from date of fire. Notice of fires should be sent promptly to your local newspaper.

5. Considerable difficulty has arisen this past year because of inaccuracy of statements as to causes of fires or because the information was not complete. Please give complete and exact information as to cause of fire.

6. Don't forget to send a report (Form 15) for each fire, even though there may be no bill for its extinction.

7. Some unfavorable criticism has come to headquarters this year to the effect that some wardens have not arrived at fires promptly and that employes have been allowed to take things easy on the fire line. We understand the circumstances under which such criticism is unjust, but we ask our wardens to be careful in these matters.

8. A number of our wardens have received a circular letter from Washington, D. C., asking them to join the American Forestry Association, and offering membership, certain books, and advice upon the payment of \$3.00. That letter was not written upon our advice or with our knowledge and wardens are at liberty to pay no attention to it if they so desire. Membership in the Association, the magazine, and the book are worth the price, but we have a Pennsylvania Forestry Association which supports our work. Membership, including its magazine, costs \$2.00 per year. If any forestry association is joined by our wardens, preference should be given to the one in our own State. Membership in any association, or subscription to any magazine, is not required.

B. F. P. Circular letter 14.

Three thousand two hundred copies of the following circular letters were sent to timber cutters:

May 1, 1916.

Dear Sir: In 1860, Pennsylvania stood first in the list of timber producing states. In 1910, she stood fourteenth with a cut of over one and a half billion board feet. According to estimates for 1915 she is now cutting less than one billion board feet and a large part of this is in the form of poles, ties, mine props, and cord wood. When the comparatively small supply still remaining in our scattered virgin tracts is exhausted, the cut will drop to less than one-half billion board feet annually. Had our forests been protected from fire after lumbering we could still be cutting yearly from two to three billion feet, and would have the prospect of continuing to cut this amount for all time without any further worry on our part, so long as the fires are kept out. If, in addition to that, we should undertake to practice scientific forestry, this cut could easily be doubled.

As a timber cutter of Pennsylvania, a man whose business depends for its very existence upon the maintenance of a forest cover upon our mountain lands, is this not of vital interest to you? What are you doing to protect your interests?

The annual loss to timberland owners of Pennsylvania through forest fires is fully \$5,000,000. The loss to the persons who would be employed in the cutting of this timber that we will not allow to grow amounts to several times as much. You share it! To offset this tremendous loss the 1915 legislature appropriated \$45,000 to cover a period of two years. Evidently little preventive work can be done with this sum, even though "an ounce of prevention is worth a pound of cure."

On September 1, 1915, the new Bureau of Forest Protection began work under an act passed by the last legislature. At the next session an appropriation of \$75,000 per year will be requested. This is about one cent per acre for the total area protected, and is only a fraction of one per cent. of the annual loss suffered by the timber cutters of Pennsylvania. Are you sufficiently interested in your own property to ask the members of the legislature from your district to support adequate appropriations for this work?

B. F. P. Circular letter 11.

The following circular letter was sent to 600 dealers in sporting goods. 165 replies were received and all of them expressing an interest in forest protection and a desire to be of help in the work. Two hardware men asked for window displays showing the loss resulting from fires. The Bureau of Publicity is now working on such a display. It will be available early next year.

October 21, 1916.

Dear Sir: We believe you are interested in good business today, tomorrow, and for the future indefinitely. Forest fires in this State have already destroyed much business and will continue to do so as long as they are permitted to rage. There is certainly some point of contact which you have with the forest which should arouse or maintain your interest in forest protection.

We are therefore inclosing some forest fire literature to be used especially on or in packages purchased by sportsmen or others going into the woods. The stickers may be used to seal small packages and do away with the necessity of using cord. They can be stuck on cartridge boxes, etc. The use of this literature by you will do much in your community toward advancing public opinion against forest fires. If you can use more to advantage, kindly let us know. If you do not care to use them, please do not throw them away but hand them to some one who is interested.

B. F. P. Circular letter 15.

The following circular letter was sent to five large manufacturers of ammunition sold in Pennsylvania.

May 30, 1916.

Gentlemen: This Department is endeavoring to do everything it possibly can to prevent the burning of forests and we are asking and obtaining the co-operation of all classes of people. However, educational activities must be continued and suggestions must come from every possible angle. We know that you people furnish a great deal of material for the use of Pennsylvania hunters. The hunters themselves are interested in the protection of the forests, however, at times are rather careless. For several seasons in a great many portions of the State we have been supplying cartridge dealers with stickers, such as are inclosed, to be placed upon packages obtained by hunters at the stores. We believe that some satisfactory results have been accomplished. We do not want to make any request upon you which will necessitate any financial burden but we would like to know whether or not it is possible to obtain any sort of co-operation in the way of having some item with respect to the necessity for carefulness in the use of fire in the woods either upon the outside of the cartridge box or upon a separate piece of paper to be placed inside of each cartridge box. Is there any way in which you can help us or we can help you in this matter?

I believe, as a matter of fact, that preservation of the forests, and consequent preservation of game, is a direct benefit to you, for certainly with a decrease in game you would begin to have a decrease in sales within the borders of this State.

The Remington Arms U. M. C. Company and the Peters Cartridge Company were the only ones who would do anything. The others believe in the proposition but could do nothing to help. The Remington Company are publishing our news items in their "Live News" which is sent all over the United States. They also promise better things in the near future. The Peters Cartridge Company furnished us with a list of their dealers and through them we got in touch with sporting goods dealers. We call the Sportsmen's attention to the two companies who are willing to help protect the forests.

One manufacturer of tents, camp outfits, and supplies, is using our stickers.

The following is the contents of Department Circular 17 issued under the heading "Carelessness vs. Good Citizenship or Who Pays the Freight?":

What Forest Fires Do in Pennsylvania

Fires cause the loss of human lives. While the number of lives lost directly from this cause in Pennsylvania is small, yet some people have been burned to death and no one knows how soon others may be.

Fires cause the loss of homes. Not infrequently have forest fires furnished the spark that burned the house and possessions of families living within or near a forest.

Fires cause the loss of fences, sheds, crops, stock, etc.

Fires cause the loss of felled timber. Felled trees represent time and money. The further the process of manufacture is carried the more valuable the product. Every year thousands of dollars worth of logs, bark, cord wood for various purposes, ties, poles, posts, and sawed lumber is destroyed. The workman may be out his time or wages; the owner may be out the wages paid and the profits; the user must so much the sooner pay a higher price for his wood because the supply is decreased by just so much; the Commonwealth at large suffers because property is destroyed, everybody concerned is made poorer, and no further wages, taxes, or use are possible.

Fires kill much growing timber. Fire burns the bark of trees and heats the wood immediately below the bark. The living layer of wood is just beneath the bark. If the cells of this wood are heated to a sufficient degree they cease to do their work. If the tree is small, the fire, hot, or the species a sensitive one, the tree is practically girdled and dies. Where leaves and brush are piled around trees, the fire may be sufficient to burn through or to make such a scar that the first strong wind will blow the tree down. Some trees are more sensitive than others. White pine, especially young trees, and beech are very sensitive. Pitch pine is very resistant. When the pines are killed by fire, roots as well as stem are dead, whereas most hardwoods may be killed above ground but remain alive below and send up sprouts again. Spring fires are more disastrous than fall fires.

Fires injure much growing timber. When the trees are large or the bark heavy and the fire light, not many trees are killed, but the majority are injured. The trees are only partly girdled, bark drops off on one side of the base, insects and fungi begin work, and succeeding fires continue to eat into the tree and finally destroy a good part of it or kill it.

Fires destroy seeds, small seedlings, and sprouts. Upon the forest floor, mixed with leaves and humus are many tree seeds of various kinds waiting for favorable conditions to germinate and grow into trees. In most cases where stock and fire have been kept out of woodland for several years, there are thousands of young trees started, but are hardly noticeable. Fire destroys all of these, as a very small amount of heat will destroy the germ within a seed, and cook the life out of the tender plants. Even the lightest fires do considerable damage in this way, destroying the germs of prospective forests.

By reason of the last three effects of forest fires, repeated burnings may change entirely the character of a forest in almost all of its phases, or forest conditions may be destroyed totally. The better species of trees may give place to fire cherry, quaking aspen, birch, or other light winged species. All tree growth may give place to scrub oak, sweet fern, huckleberry, bracken, or common annual herbaceous weeds. So it is reasonable to say that forest fires destroy forests and the possibilities of future forests.

Fires destroy, wholly or in part, the litter and humus on the ground within the forest. Light fires burn some leaves and small branches. Heavier fires burn everything down to mineral soil, some even following roots and other vegetable matter into the soil.

(a) Forest litter and humus are a mechanical hindrance to the run-off of precipitation, allowing water to reach the stream slowly.

(b) Humus absorbs and holds rains and melted snows, giving it to the soil for the underground supply which feeds springs.

(c) Humus keeps the soil open, summer and winter, permitting it to take moisture rapidly.

(d) Litter and humus act as a mulch preventing rapid evaporation of soil moisture.

(e) Humus keeps the surface soil fertile, which helps to make good tree growth.

(f) Humus protects the surface soil from erosion.

(g) Humus is said to prevent the complete development of many injurious insects.

Changing humus to ashes eliminates all of the above benefits. Floods, erosion, irregularity and impurity of water supply both for home supply and for power, and all the calamities attendant upon these conditions are the results. The loss cannot be estimated in dollars.

The opening of the forests and the removal of humus by fire bring about conditions which make it easier for fires to rage. Each successive fire makes conditions more favorable for the next, until in time everything of value is destroyed and desolation results.

Fires destroy game and fish. Spring fires, especially, are fatal to young animals of all kinds, and many bird eggs are destroyed. Not infrequently both in spring and fall the water of some of the small streams has been heated sufficiently to kill fish. By destroying the factor which largely regulates the steady flow of streams and by making the banks of the streams bare of their natural protection, fish life is seriously affected.

Fires cause a decrease of bird life. Bird eggs and young birds are destroyed directly. By reason of frequent disturbance birds are driven away from a region of forest fires. By the destruction of the forest and the making of desolate hills, conditions favorable to bird life are destroyed and birds become scarce. Scarcity of birds adversely influences agriculture.

Fires destroy the beauty of a region. The beauty of certain regions is responsible for bringing to them millions of dollars each year. Green forests covering the mountains and keeping the streams steady and clear are the most important factors in the maintenance of this asset. Fires promote desolation rather than life and beauty. A fire swept region is anything but beautiful.

Forest fires are calamities. They destroy great values without the least compensating benefit, and the trail of loss in wages, industry, taxes, revenue, prosperity, sport, health, comfort, and even life, leads to every home in the land.

The prevention of forest fires is absolutely necessary for the welfare of Pennsylvania. Some fires will occur. They must be discovered quickly. They must be reported quickly. They must be attacked and extinguished quickly. This means that Pennsylvania must have an efficient organization and equipment for the prevention, detection and extinction of forest fires.

The organization is being effected. It must be completed and furnished with necessary equipment.

Observation towers must be erected and equipped.

Telephone lines must be built.

Fire hazards must be eliminated.

Our people must be educated.

You help bear the loss of forest fires. The loss is far greater than the cost of prevention could ever be. Why not save for yourself and the Commonwealth by being careful yourself, by urging others to be careful, by helping to extinguish fires when you see them, and by insisting that the Legislature and Governor provide an adequate sum of from \$150,000 to \$200,000 for two years for this important preventive and remedial work?

LEGAL AFFAIRS

In accordance with the part of the law directing the Chief Forest Fire Warden "to collect and arrange information concerning violation of laws relating to the protection of forests from fire, and to present the same to the Commissioner of Forestry," soon after fires started in the spring and reports from wardens came in, a number of cases were prepared and presented to the Commissioner of Forestry, who in turn forwarded them to the Attorney General. During the year the following cases were referred to the Attorney General.

Legal Action Ordered and Cases Now Closed

MONROE COUNTY.

November 10, 1915. Reported by forester John L. Strobeck, as having burned over 8 acres of private lands. Frank Lape, Joe Lape, Rollin George, and Dr. F. P. Summa, of Nanticoke, smoked out a coon on land belonging to George Wagner of Pocono Lake. In December, the Monroe County court imposed a fine of \$10.00 and costs upon the four hunters who plead guilty. \$25.00 damages paid to owner of land.

McKEAN COUNTY.

May 11, 1916. Keating township. Reported by forester R. Lynn Emerick as having burned over 12 acres of private land, with total loss of \$25.

Reported as having been started from sparks from a clearing set on fire by Sam Oliver. Case tried in September court, McKean county, and defendant settled by paying costs of suit, and \$25 damages to Hyland Bros., owners of land damaged.

No expense to State for extinction.

POTTER COUNTY.

May 11, 1916. Summit township. Reported by warden Albert O. Baker as having burned over 10 acres of State and 40 acres of private land, causing a loss of \$50.

Caused by Wm. Smith setting fire to logs and brush in clearing. Suit instituted and defendant plead guilty. Sentence was suspended upon payment of the costs of prosecution, and a reprimand in open court.

Cost of extinction to State \$21.85.

LACKAWANNA COUNTY.

May 2, 1916. C. H. Eschenbach refused to aid forest fire warden Chas. Hessler. Mr. Hessler was instructed to bring suit. Defendant had a hearing before Walter Seroko, Justice of the Peace, and produced papers from two physicians. Dr. Kerling, of Gouldsboro and Dr. Ahlhouse, of Wilkes-Barre, to the effect that he was unable to travel through the woods to fight fire, on account of rheumatism. The justice dismissed the case. Notwithstanding the statements of the physicians, the defendant is a carpenter and at the time of the fire was doing scaffolding and roof carpentering work.

Legal Action Ordered and Now Pending

BLAIR COUNTY.

April 18, 1916. Frankstown township. Reported by warden H. E. Chamberlin as having burned over 400 acres of private land and doing \$550 damage. Cause of fire given as "sparks from McKelvey Bros. engine."

Cost of extinction, \$2.50.

Prosecution ordered in connection with fires of 1915. Still in hands of district attorney.

Later fires caused by same company:

May 14, 1916. 20 acres. Cost of extinction \$3.25 Damage, \$25.00.

December 7, 1916. 25 acres. Cost of extinction \$3.57. Damage, \$100.00.

April 18, 1916. Woodbury township. Reported by warden R. R. Maloney as having burned over 1000 acres of private land and doing \$2000 damage. Cause of fire given as "spark from stave mill of Frank Beers. Spark blew in old tree and tree burned down, then woods were fired from it."

Prosecution to be ordered if investigation warrants.

FAYETTE COUNTY.

May 11, 1916. Henry Clay township. Reported by warden Joseph H. Humbers-ton as having burned over 500 acres of private land, and causing damage of about \$650.

Cause of fire given as "burning brush on land of John Holt."

Cost of extinction, \$21.05.

Prosecution recommended.

FRANKLIN COUNTY.

November 12, 1916. Reported by forest ranger John Bricker. Ranger Bricker saw Herman McFerren light a match and fire the leaves.

Prosecution ordered November 14, and warrant issued immediately.

This same young man was before the court last year upon the same charge and was acquitted largely on account of sympathy.

FULTON COUNTY.

April 30, 1916. Brush Creek township. Reported by forester A. E. Rupp as having burned over 150 acres of private land, causing a total damage of \$300. Cause of fire given as incendiary. "Three persons, viz., Scott Wible, Wm. Hampton, and John Hampton were seen by Archie Fredric, of Wells Tannery, coming from the fire immediately after it started."

Cost of extinction, \$15.46.

Investigation recommended.

LACKAWANNA COUNTY.

May 4, 1916. S. P. Wentzel, Ralph Wentzel, and Christ Brady, of Thornhurst, refused to aid forest ranger W. L. Kauffman to fight forest fire. Prosecution ordered.

S. P. Wentzel waived a hearing and gave \$300 bail for appearance at court. Ralph Wentzel's case was dropped on account of his age, being only 16 years old. Brady was held in \$300 bail for court. Brady's case was ignored by the grand jury, and S. P. Wentzel was acquitted.

Further prosecution ordered.

LEHIGH COUNTY.

April 19, 1916. Lynn township. Reported by warden George H. Rabert as having burned over 15 acres of private land, causing a loss of about \$100.

Origin of fire unknown, but suspicion directed against party living in the neighborhood as incendiary.

Cost of extinction, \$5.58.

Investigation recommended.

LUZERNE COUNTY.

May 11-12, 1916. Fairview township. Reported by wardens Richard I. Conety and A. F. Bond, as having burned over an area of from 7 to 8 miles square.

Reported as having been caused by spark from Lehigh Valley Railroad engine.

Cost of extinction, \$240.05. Prosecution ordered.

LYCOMING COUNTY.

December 8, 1916. Lewis Venemens refused to aid warden Silas Hostrander to extinguish forest fire.

Referred to Attorney General December 20, 1916.

Prosecution ordered.

POTTER COUNTY.

April 16, 1916. Eulalia township. Reported by forester R. Lynn Emerick as having burned over 30 acres of private land, causing damage amounting to \$15.

Caused by sparks from burning pasture field by Frank McNamara.

Cost of extinction to State, \$8.80.

Prosecution ordered. Warrant issued awaiting return of McNamara.

WESTMORELAND COUNTY.

April 20, 1916. Unity township. Reported by warden R. N. Johnston as having burned over 25 acres of private land, causing a damage of \$250.

Reported as being caused by saw mill belonging to Harry Roadman who did not try to extinguish it.

Cost of extinction to State, \$8.01. Prosecution ordered.

May 11, 1916. Series of six fires. Ligonier township. Reported by warden John W. Darr as having burned over 125 acres of private land, causing damage amounting to \$253. Fire started by unknown person or persons.

Cost to State for extinction, 4 fires, 60.51; 2 fires, no expense.

Investigation by State Police.

Nov. 5-6, 1914. Blair Lumber Company. Claim for damages to State land.

Legal Action Refused

LYCOMING COUNTY.

April 19-26, 1915. Reported by forester H. C. Evans as having burned over 300 acres of State Forest and 3,000 acres of private land. The cause of the fire is given as "Marion Campbell burning rubbish in a field belonging to his father, in a careless manner." A strong wind was blowing and fire spread quickly to adjoining property.

Refused on ground of length of time elapsed since fire and belief in inability to obtain conviction.

Bill for extinction paid by State amounted to \$104.31.

Time of forestry officials amounts to an additional sum of \$56.70.

BEDFORD COUNTY.

April 16, 1916. West Providence township. Reported by warden R. W. Weicht as having burned over 3½ acres of private land, and doing probably \$10 damage. The cause of the fire was given as "set by two boys, George Price, son of Mrs. Emma L. Price, and Frank Shaup, son of Jacob Shaup, of Everett, R. F. D. No. 7.

Bill for extinction \$3.55.

Mrs. Price and Mr. Shaup both written to and cost of extinction was paid by Mr. Shaup. Check endorsed to State Treasurer.

April 17, 1916. Monroe township. Reported by warden Erastus Diehl as having burned 7 acres of private land. Cause of fire given as "burning a new ground by Conda Wilson, Steckman, Pa."

Bill for extinction paid by the State, \$6.33.

Mr. Wilson admits setting the fire. A sudden gust of wind carried sparks into woodland. Mr. Wilson helped to extinguish the fire.

Mr. Wilson has been asked to reimburse the Commonwealth for cost of extinction.

April 18, 1916. West Providence township. Reported by warden R. W. Weicht as having burned over 15 acres and doing damage to extent of \$53.00. Cause of fire is given as "set by sawmill engine belonging to Blain and Marshal Foor, Everett R. F. D. No. 5."

Bill for extinction paid by the State, \$2.65.

Messrs. Foor have been asked to reimburse the Commonwealth.

April 18, 1916. East Saint Clair township. Reported by warden D. W. Stambaugh as having burned 3 acres of private land and doing about \$30 worth of damage. Cause of fire is given as "sparks from sawmill of Ross Crissman, Saint Clairsville, Pa."

Bill for extinction paid by the State, \$2.07.

Mr. Crissman admits that the fire came from his engine but that it was his first fire in twelve years and he does not expect to reimburse the Commonwealth. He was hired to do sawing for Mr. Isaac Campbell whose land was burned over.

Mr. Crissman and Mr. Campbell have been asked to reimburse the Commonwealth.

May 12, 1916. West Providence township. Reported by warden R. W. Weicht having burned over about 75 acres of private land and doing probably \$150 damage. Cause of fire was given as "Broke out from burning new ground by Charles Stayer, Everett, R. F. D. No. 3."

Bill for extinction paid by the State, \$25.47.

Mr. Stayer was asked to reimburse the Commonwealth for the cost of extinction, which he has done.

BERKS COUNTY.

April 15, 1916. Hereford township. Reported by warden Adam L. Mensch as having burned over 6 acres of private land and doing \$12 damage. Cause of fire given as "burning a brush pile on Gery's property."

Cost of extinction, \$2.11.

Mr. Gery was asked to pay for extinction but later excused because fire did not endanger forest property.

BLAIR COUNTY.

May 1, 1916. Logan township. Reported by warden R. L. Goetz as having burned over 450 acres of private land and doing \$2,250 damage. Cause of fire was given as "burning brush on adjoining land of E. M. Wilson. Mr. Wilson admits that brush fire got beyond his control."

Cost of extinction, \$17.20.

Mr. Wilson was asked to pay cost of extinction, which he did, and check was endorsed to the warden.

May 6, 1916. Frankstown township. Reported by warden W. F. Hyle as having burned 100 acres of private land. Cause of fire given as "J. L. Hartman's dinkey engine." The land burned over belongs to Mr. Hartman.

Bill for extinction paid by the State, \$7.30.

Mr. Hartman has been requested to reimburse the Commonwealth for extinction.

FAYETTE COUNTY.

April 20, 1916. North Union Township. Reported by warden John C. Beatty as having burned over about ½ acre of private land. Damage slight. Supposed that fire was accidentally started by John Churly and Mike Churly of Lemont Furnace. Legal action refused. Suspected parties written to and cautioned.

No expense to State for extinction.

FULTON COUNTY.

April 18, 1916. Bethel township. Reported by forester A. E. Rupp for warden Andrew Bishop, as having burned over 6 acres of private land, and doing about \$20.00 damage. Cause of fire given as "sparks from a traction engine burning wood. The engine is owned and operated by Frank Schetrompf, Warfordsburg, Pa. He has engine equipped with two spark arresters, is careful, and helped to extinguish the fire."

Bill for extinction paid by the State, \$4.86.

Mr. Schetrompf has been asked to reimburse the Commonwealth for cost of extinction.

HUNTINGDON COUNTY.

May 12, 1916. Todd township. Reported by Warden Amon Saylor as having burned over $\frac{1}{2}$ acre of private land. Report states "Mrs. James McNeal will swear she saw the Juniata & Southern engine start it."

Referred to the Attorney General. Advised to hold for the present.
Cost of extinction paid by State, \$3.42.

LYCOMING COUNTY.

May 9, 1916. Franklin township. Reported by warden J. D. Lunger as having burned over 12 acres of private land and doing about \$50 worth of damage. Cause of fire is given as "supposed to have been set by the young son of Margaret and Samuel Poust, Opp, R. F. D., Pa., with intent to burn adjoining land. The boy was seen by two persons to leave the woods a short time before the fire was discovered and his family made no effort to fight the fire, and threatened to prosecute for trespass those who helped." The land burned over belonged to Margaret Poust.

Cost of extinction, \$15.70.

Mr. Poust has been requested to reimburse the Commonwealth.

May 10, 1916. Cummings township. Reported by forester H. C. Evans as having burned over 200 acres of private land. Origin of fire is given as spark from N. Y. C. Railroad engine.

Cost of extinction to State, \$6.55.

POTTER COUNTY.

May 11-12. Abbott township. Reported by forester H. C. Van Horn as having burned over 160 acres of State Forest and 20 acres of private land. The damage amounts to about \$450.00. Cause of fire given as "spark from burning stump in plowed field of Louis Gnau, Crossfork, R. F. D. No. 1." Bill for fire extinction paid by State, \$73.00. This amount does not include a charge of \$6.60 for forester's time.

Mr. Gnau has been asked to reimburse the Commonwealth for bill for extinction, \$73.00.

TIOGA COUNTY.

May 1, 1916. Shippen township. Reported by warden O. E. Peters as having burned over 990 acres of State and 110 acres of private land. Cause of fire given as "Chester Decker (aged 15 years) burning a brush pile."

Cost of extinction to State, \$21.73.

Mr. Decker has been asked to reimburse the Commonwealth for bill of extinction and has promised to do so.

May 11, 1916. Shippen township. Reported by warden O. E. Peters as having burned over 100 acres of State land and 1 acre of private land, causing damage of about \$25.

Fire started along N. Y. C. Railroad, supposedly caused by trains shifting in vicinity.

Cost of extinction, \$8.37.

The greater number of cases presented to the Attorney General were ruled out on the ground that no suit should be started where it was thought by him that a conviction was uncertain. On the other hand, the attitude of the Department of Forestry is that if a law of the Commonwealth is violated, it is the duty of those en-

trusted with the enforcement of the law to see that some action be taken, and that as soon as possible after the violation. The people of the State so long have violated with impunity the rights of their neighbors and the Commonwealth itself with their carelessness and indifference to forest fires that it is absolutely necessary to bring about a change in attitude.

Our desire is not to prosecute or persecute indiscriminately with heavy penalties for in many cases no criminality exists. We also realize that "exact justice is usually injustice." In short, we simply want it to be understood commonly that when a fire is started, it must be controlled so as to do no damage to innocent parties, and that if it does do damage, a penalty will be meted out swiftly. The intention of our law is to hold every one responsible for loss occasioned by fire started by himself, or by his operations; and whether he be a natural individual, or an artificial person created by law. It is the duty of the State to fix responsibility for the fire, then individuals who have suffered have a chance to present claims for their losses. Even though a conviction may not be obtained, every fair case means additional education upon the subject of forest fires and their dangers. The officers of the State are given credit for performing their duties, a feeling which is none too common, and the results will justify the expense.

In May, 1913, Veris Burkholder and C. E. Kreighbaum admitted responsibility for a camp fire upon State lands in Lycoming county. Mr. Kreighbaum left home before a warrant could be served upon him. Mr. Burkholder paid a fine and costs amounting to \$44.90. In April, 1916, Mr. Kreighbaum returned and voluntarily offered to pay whatever penalty should be placed upon him. He was ordered to reimburse Mr. Burkholder for half the amount paid by him. The case, therefore, is now closed satisfactorily to all parties.

On December 7, 1916, a fire was reported between Tombs and Ramsey stations, Lycoming county, which was extinguished after burning about 15 acres of private property. From information gathered in this section, everything pointed to a Mr. Frank Holden as the party guilty of setting this fire.

On December 8th, this same party left Waterville for his home at Lucullus, setting on the way 25 separate fires, burning approximately 3,000 acres of State and private lands before they could be extinguished.

Forester Robert R. Neefe caused the man's arrest and he confessed to setting one fire on December 7th and all the fires on December 8th. He had him placed in the county jail at Williamsport, and on December 9th had a preliminary hearing before alderman Geo. W. Rianhard of Williamsport. He plead guilty and was placed in jail in default of \$500 bail for trial at Quarter Sessions Court in March, or at the pleasure of said court.

Legal action being refused in so many cases, it was decided to take up each case directly with the person responsible for the fire and appeal to his sense of fairness. Each one has been asked to reimburse the Commonwealth for the cost of extinction and to make good the loss suffered by adjoining land owners. The following is a roll of honor:

Bills Paid and Amounts Forwarded to Forest Fire Wardens

County.	Township.	1916.	Cause.	Cost of Ex-tinction.	Paid By.
Bedford,	South Woodbury, ...	May 1	Burning brush..	\$1 55	Andrew Lamborn.
Bedford,	Southampton,	11	Clearing land...	22 69	Fred. Tewell.
Blair,	Logan,	1	Burning brush..	17 20	E. M. Wilson.
Centre,	Rush,	Oct. 7	Dinkey engine...	3 25	Penna. Fire Brick Co.
Juniata,	Beale,	April 19	Burning brush..	55 32	Geo. W. Wilson.
Northumberland, ..	Snydertown Boro., ..	May 12	Burning brush..	6 50	W. F. Kilne.
Tioga,	Gaines,	12	Burning brush..	11 35	Casper Eggler.

Bills Paid and Checks Refunded to State Treasurer

County.	Township.	1915.	Cause.	Cost of Ex-tinction.	Paid By.
Lancaster,	West Donegal,	April 14	Burning brush,	\$32 35	S. Bailey.
		1916.			
Bedford,	West Providence, ..	April 16	Boys,	\$3 55	Jacob Shaup.
Bedford,	West Providence, ...	May 12	Clearing land..	25 47	Charles Stayer.
Bedford,	East Providence,	15	Clearing land..	21 20	Samuel Cooper and D. R. Scott.
Blair,	Catharine,	Nov. 2	Road roller...	6 00	County commissioners.
Centre,	Rush,	May 12	Dinkey engine,	5 98	Penna Fire Brick Co.
Centre,	Rush,	12	Dinkey engine,	4 17	Penna Fire Brick Co.
Elk,	Highland,	Oct. 12	Burning brush,	8 85	Gilbert Sinkler.
Fayette,	Bullskin,	May 11	Burning brush,	8 75	Cyrus Stouffer.
Huntingdon,*	Morris,	April 29	Engine,	4 55	Federal Refractories Co.
Huntingdon,	Union,	May 1	Dinkey engine,	14 80	General Refractories Co.
Juniata,	Milford,	Mar. 31	Engine,	2 80	Vincent Lumber Co.
Juniata,	Milford,	31	Engine,	2 50	Vincent Lumber Co.
Lehigh,	Upper Saucon,	May 1	Burning brush,	4 02	H. M. Bachman.
Potter,	Eulalia,	13	R. R. engine...	34 55	C. & P. A. R. R. Co.
Somerset,	Jefferson,	June 1	Burning brush,	2 20	Emanuel Enos.
Tioga,†	Elk,	April 7	R. R. engine...	.....	Leetonia R. R. Co.
Warren,	Pittsfield,	Nov. 8	Burning brush,	6 63	A. W. Durlin.
Warren,†	Southwest,	Aug. 2	Burning brush,	30 50	Haskell Bros.
Warren,	Southwest,	17	R. R. engine...	7 93	N. Y. C. R. R. Co.
Warren,	Southwest,	17	R. R. engine...	1 62	N. Y. C. R. R. Co.
Westmoreland, ...	Cook,	Dec. 8	Burning brush,	14 50	S. P. Emert.

*\$25.00 additional paid by company for damage to State land.
 †\$10.00 paid by company for damage to State land.
 ‡A later bill of \$4.00 was not presented for payment.

Pending Forest Fire Claims, December 31, 1916

County.	Township.	Date.	Cost of Ex-tinction.	Name.	Cause of fire.	Remarks.
Adams,	Hamiltonban,	Nov. 20, 1916.	\$5 44	John D. Kump,	Boy.	
Bedford,	Monroe,	April 17, 1916.	6 33	Conda Wilson,	Burning brush.	
Bedford,	West Providence, ..	April 18, 1916.	2 65	Blain For,	Sawmill engine.	
Bedford,	East Saint Clair, ..	April 18, 1916.	2 07	Ross Crissman,	Burning brush.	
Bedford,	Woodbury,	May 11, 1916.	33 65	Pearl Smith,	Logging engine.	
Bedford,	Frankstown,	May 6, 1916.	20 24	M. E. McNeal,	Engine.	
Blair,	Logan,	May 12, 1916.	7 30	J. L. Hartman,	Burning brush.	
Blair,	Greenfield,	Nov. 27, 1916.	5 15	M. L. Geisinger,	Engine.	
Blair,	Catharine,	Dec. 7, 1916.	3 25	Tony Falbo,	Burning brush.	
Blair,	West Taylor,	Oct. 1, 1916.	4 15	General Refractories Co.,	Burning brush.	
Blair,	Rush,	Oct. 28, 1916.	33 40	Michael Roth,	Engine.	
Centre,	Woodward,	Oct. 10, 1916.	15 15	Penna. Fire Brick Co.,	Engine.	
Centre,	Leidy,	Oct. 28, 1916.	8 10	Penna. Fire Brick Co.,	Engine.	
Centre,	Woodward,	Oct. 4, 1916.	49 90	T. G. Alabrac,	Drill engine.	
Clinton,	Chapman,	Oct. 12, 1916.	5 85	A. J. Gotschall,	Engine.	
Clinton,	Leidy,	Oct. 4, 1916.	4 41	A. J. Gotschall,	Engine.	
Columbia,	Cunningham,	Nov. 6, 1916.	3 03	Lehigh Valley Coal Co.,	Engine.	
Columbia,	Pine,	Sept. 4, 1916.	20 30	William Lumber Co.,	Burning brush.	
Dauphin,	Wayne,	April 11, 1916.	24 62	Zortman Lumber Co.,	Burning brush.	
Fayette,	North Union,	April 20, 1916.	13 00	Ohio Lumber Co.,	Engine.	
Fayette,	Henry Clay,	Oct. 27, 1916.	17 35	Indian Creek R. R. Co.,	Engine.	
Fayette,	Springfield,	Oct. 28, 1916.	4 86	F. Scherumpf,	Traction engine.	
Fulton,	Bethel,	April 18, 1916.	33 50	Wilber Berstesser,	Burning brush.	
Fulton,	Taylor & Wells, ..	May 13, 1916.	67 77	Juniata & Southern R. Co.,	Engine.	
Huntingdon,	Todd, Lincoln and Penn.	April 3, 1916.	7 32	Elmer Wogan,	Sawmill engine.	
Huntingdon,	Warriors Mark,	May 10, 1916.	\$2 61	Juniata & Southern R. Co.,	Engine.	
Huntingdon,	Todd,	May 12, 1916.	\$2 61	Wm. Appleby,	Sawmill engine.	
Huntingdon,	Todd,	Nov. 12, 1916.	\$3 90	Juniata & Southern R. Co.,	Engine.	
Indiana,	East Wheatfield, ..	May 14, 1916.	23 07	Cramer Quarry Co.,	Asbes.	
Juniata,	Susquehanna,	May 12, 1916.	23 07	David Hoover,	Burning brush.	
Lehigh,	Lynn,	Dec. 18, 1916.	20 60	Charles D. Fink,	Sawmill engine.	
Luzerne,	Corryham,	April 18, 1916.	32 30	James Dodson,	Children.	
Luzerne,	Dennison,	May 10, 1916.	5 05	E. P. Searfoss,	Boy.	
Lycoming,	Franklin,	May 9, 1916.	15 70	Samuel Poust,	Burning brush.	
Lycoming,	Upper Fairfield, ..	May 13, 1916.	5 11	Chas. Tool,	Burning brush.	
McKean,	Hamilton,	May 11, 1916.	15 73	Gus. A. Carlson,	Burning brush.	

Pending Forest Fire Claims, December 31, 1916—Continued

County.	Township.	Date.	Cost of Extinction.	Name.	Cause of Fire.	Remarks.
Monroe.	Hamilton.	May 9, 1916.	17 05	C. A. Myers.	Sawmill engine.	
Potter.	Pike.	May 10, 1916.	3 38	George Pierce.	Burning brush.	
Potter.	Hector.	May 11, 1916.	21 65	Mrs. Ira McFall.	Burning stumps.	Damage to State land.
Potter.	Abbott.	May 12, 1916.	73 00	Louis Gau.	Sawmill engine.	
Potter.	Homer.	May 12, 1916.	12 23	Geo. Glase.	Burning logs.	
Potter.	Abbott.	Nov. 3, 1916.	6 09	Frank Yilek.	Sawmill engine.	
Snyder.	Higgins.	April 19, 1916.	65 11	V. Savage.	Burning logs.	
Snyder.	Franklin.	May 11, 1916.	11 36	Gelinet & Gemberling.	Sawmill engine.	
Somerset.	Franklin.	April 20, 1916.	4 75	M. E. McNeal.	Logging engine.	
Somerset.	Shade.	Dec. 7, 1916.	2 65	M. G. Gindlesperger.	Burning brush.	Damage to State land.
Tioga.	Shippen.	May 3, 1916.	21 73	Geo. Decker.	Burning brush.	
Tioga.	Shippen.	Aug. 19, 1916.	14 95	Henry Smith.	Burning brush.	
Wayne.	Palmyra.	May 15, 1916.	14 05	C. J. Schlager.	Burning brush.	
Westmoreland.	Fairfield.	May 1, 1916.	22 60	Booth & Flynn.	Engine.	
Westmoreland.	Ligonier.	May 13, 1916.	5 78	H. R. Johns Lumber Co.	Clearing log yard.	

There are also pending the following claims:

Against the Philadelphia & Reading Railroad Company for damage done to State land in Cumberland county as a result of a fire in 1914 and another on May 6 and 7, 1916, \$1,075.00.
 Against the Pennsylvania Railroad Company for damage done to State land in Elk county as a result of a fire in April, 1915, \$494.95.
 Against H. K. Van Tuyl, a former fire warden, for misappropriation of money paid him for fire extinction. Amount of claim, \$38.97, of which \$15.00 has been paid.

Claims for Forest Fire Extinction Withdrawn

County.	Township.	Date.	Cost of Extinction.	Name.	Cause of Fire.	Remarks.
Bedford.	Monroe.	Oct. 31, 1916.	\$7 45	T. O. Meakle.	Traction engine.	Lack of evidence.
Becks.	Hereford.	April 15, 1916.	2 11	Chas. N. Gery.	Burning brush.	Lack of evidence.
Blair.	Huston.	April 18, 1916.	23 95	Chas. W. Reeder.	Sawmill engine.	Lack of evidence.
Cambria.	Jackson.	May 1, 1916.	3 25	Mrs. F. Adams.	Sawmill engine.	Excused on account of poverty.
Cameron.	Emporium Boro.	April 7, 1916.	9 90	Geo. L. D. Robinson.	Burning brush.	Excused on account of poverty.
Carbon.	Mauch Chunk.	April 16, 1916.	41 75	Warren Juncr.	Burning brush.	Excused on account of poverty.
Carbon.	Franklin.	Sept. 2, 1916.	8 20	Emerson Strohl.	Burning brush.	Excused on account of poverty.
Centre.	Rogers.	May 1, 1916.	32 32	Chas. Smoyer.	Burning brush.	Excused on account of poverty.
Centre.	Half Moon.	May 11, 1916.	46 92	J. O. Kerstetter.	Burning brush.	Excused on account of poverty.
Centre.	Penn.	Sept. 1, 1916.	6 85	Dan. Kerstetter.	Burning brush.	Lack of evidence.
Clearfield.	Beckaria.	May 10, 1916.	13 00	Alfred Dubler.	Engine.	Lack of evidence.
Clinton.	Crawford.	April 5, 1916.	7 70	White Deer Lumber Co.	Burning brush.	Expense incurred by forester for protection of State land.
Luzerne.	Dorrence.	April 18, 1916.	3 43	Lyman Searfoss.	Sawmill engine.	Lack of evidence.
Lycoming.	Gamble.	May 13, 1916.	12 65	Harvey Hessler.	Sawmill engine.	No damage to adjoining property. War-
Mifflin.	Granville.	April 18, 1916.	43 15	Harry Stover.	Burning brush.	den unnecessary.
Potter.	Sharon.	May 10, 1916.	2 52	James Ward.	Burning brush.	Lack of evidence.
Potter.	Summit.	May 11, 1916.	68 85	Bert Reed.	Burning brush.	Extreme poverty.
Schuylkill.	North Union.	May 22, 1916.	7 59	Wm. N. Foos.	Child.	Warden's services not needed. To be in-
York.	Fawn.	April 13, 1916.	12 38	Walter Stewart.	Sawmill engine.	vestigated further.

In each case that the party responsible for the fire was excused on account of poverty, it was after responsibility was admitted, investigation made as to claim of poverty, and upon our receipt of a promise to be careful with fire in the future, and to do everything possible to help extinguish future fires in the neighborhood. We feel that in these cases more good has been accomplished than could possibly have been done by legal action.

The following cases are worthy of special notice

CENTRE COUNTY—Snow Shoe Township.

May 12, 1916.—Reported by warden George McCartney as having burned over 12 acres of private land, causing a damage of \$5.00.

Caused by dinkey engine of the Lehigh Valley Coal Company, Snow Shoe, Pa. Wardens bill for extinction \$1.80, paid by the Lehigh Valley Coal Company before presentation to this office. No expense to the State.

CLINTON COUNTY—Woodward Township.

Reported by warden Ward H. Reeder.

October 10, 1916.	5 acres burned.	Cost of extinction,	\$2.30
October 11, 1916.	30 acres burned.	Cost of extinction,	7.50
October 12, 1916.	80 acres burned.	Cost of extinction,	9.24

The above mentioned fires caused by sparks from dinkey engine of the Queens Run Fire Brick Company. Bills for extinction presented to the company by warden Reeder, and paid by them, without expense to the State.

ELK COUNTY—Benezette Township.

October 29, 1916.—Reported by forester Chas. E. Zerby as having burned 2 acres of private land.

Caused by bee hunters smoking out bees. Three young men admitted responsibility for the fire and paid forester's bill for extinction, \$3.55, before its presentation to this office. No expense to the State.

FRANKLIN COUNTY—Peters Township.

November 2, 1916.—Reported by forester A. E. Rupp as having burned over 20 acres of private land and causing about \$20.00 damage.

Caused by operations of the McLean Construction Company which company at once assumed responsibility and paid bill for extinction, \$12.14, before its presentation to this office.

FULTON COUNTY—Ayr Township.

April 18, 1916.—Reported by forester A. E. Rupp as having burned over 12 acres of private land and doing damage to the amount of \$30.00.

Caused by sparks from sawmill engine owned by J. W. Mellott, McConnellsburg. Mr. Mellott admitted carelessness and paid the forester's bill for extinction, \$21.21, before its presentation to this office. No expense to the State.

LYCOMING COUNTY—Gamble Township.

May 12, 1916.—Reported by warden J. T. Eddy as having burned over $\frac{1}{2}$ acre of private land, causing a loss of \$50.

Reported as having been caused by sparks from sawmill owned by Chas. Steiger. Bill for extinction paid by Mr. Steiger to the fire warden before presentation to this office. Cost of extinction \$4.15.

NORTHUMBERLAND COUNTY—West Chillisquaqua Township.

April 16, 1916.—Reported by warden Geo. Heddings as having burned over 50 acres of private land.

Fire caused by Bucknell students, supposedly accidental. Bill for extinction, \$28.50, paid by those responsible before presentation to this office.

There are numerous instances where no claim for labor was presented either to the party responsible for the fire, or to the State. Undoubtedly there have been many cases where fires have been extinguished and bills paid without coming to the attention of this Bureau. A large number of fires are still unreported.

In several instances parents of children who were thought to have set fires were written to and cautioned. In one instance, a school teacher was asked to caution the boys of the school. In another case, a Scout Master was asked to clear up charges against several boy scouts, which was promptly done. In doubtful cases, the attention of those upon whom suspicion rested was called to the circumstances and they were cautioned.

The following cases are examples

BLAIR COUNTY—Logan Township.

October 8, 1916.—Reported by warden R. L. Goetz as a small fire and no damage being done owing to the fact that truant officer W. W. Orner arrived at scene of fire and extinguished it in its incipency.

Caused by boys 13 years of age setting fire to leaves. Boys and their parents called before fire warden and truant officer at Boy Scout headquarters and reprimanded.

No expense for extinction.

BUCKS COUNTY—West Rockhill Township.

October 28, 1916.—Reported by warden Wm. W. Plank as having burned over 10 acres of private land.

Caused by hunters smoking game out of a hollow tree. No direct evidence, but suspected parties written to and cautioned.

Cost to State for extinction, \$12.00.

CENTRE COUNTY—Haines Township.

May 11, 1916.—Reported by forester A. C. Silvius as having burned over 3500 acres of State land and 50 acres of private land, doing a total damage amounting to \$3,000.00.

Caused by careless fisherman smoking. No bill presented, but suspected parties written to and cautioned.

Cost to State for extinction, \$795.64.

FAYETTE COUNTY—North Union Township.

April 20, 1916.—Reported by warden John Shanabarger as having burned over 125 acres of private land, causing a damage of about \$400.00.

Reported as being caused by E. Victor, Fairchance, burning brush. No bill for extinction presented to Mr. Victor on account of lack of evidence, but he was cautioned in regard to fire.

Cost to State for extinction, \$9.85.

FAYETTE COUNTY—North Union Township.

Reported by warden John C. Beatty as having burned over about $\frac{1}{2}$ acre.

Caused by John and Mike Churly who were said to have admitted that the fire was started accidentally. These two men were written to and cautioned.

No expense to the State.

There still remains for investigation a case against two young fellows who set fire on State land in Clinton county in April, 1916.

In Schuylkill county, the authorities took charge of a hermitess living in Cumbola mountain and who frequently built fires in the forests, usually for cooking food. These fires seldom reached large size. The woman was sent to the county lunatic asylum.

In Clearfield county, two cases were brought against the James-town, Franklin, and Clearfield Railroad Company. According to news report, because of a legal technicality, a verdict for the defendant was rendered.

Some of the difficulties encountered by our foresters upon or near State Forests may be understood from a report by forester W. H. Horning, covering a fire in Cameron county on May 11-14, 1916.

This fire started about 10 A. M. on Thursday, May 11. Everything was as dry as tinder, due to a high wind which had been blowing for several days, and on this day the wind had become a fierce gale. The time was ripe for the fire fiends to get in their destructive work. Ranger Wykoff was stationed on a high knob at the head of Bronson Run, and I had a crew of men and boys planting trees in Lushbaugh Run. About 10 A. M. ranger Wykoff observed the first smoke rising from the southern end of the ridge which parallels First Fork Creek for a distance of five miles above Sinnamahoning. Then in rapid succession, one fire after another was set along the whole length of this five mile ridge and about noon some one set one or more fires on the big flat lying between Lick Island and Brooks Runs. Thus in a very short space of time we had a fire ten miles long, with a fierce wind to drive it over an immense area, and only a handful of men to fight it. I saw the fire at 1 o'clock P. M., and immediately hurried out to fight it with a crew of seven men. Before starting to the fire I left instructions for ranger Wykoff to get more men and come out to the fire as soon as he returned from Bronson Run. It seemed almost hopeless to attempt to put out so many miles of fire with such a small crew when the wind was fanning the flames so fiercely, but we fought as much as we could on the northeast side and succeeded in keeping it out of Brooks Run where there is a lot of valuable natural growth and some plantations.

At the Sinnamahoning end of the fire, the Aetna Explosives Company had a crew of forty men fighting to keep the fire from burning over their lands in Grove Run. Forester H. E. Elliott helped to direct the fighting of the Aetna Company's men. At the Northwestern side of the fire, Henry Hill, whom we had employed as extra ranger for the month of May, had a crew of five men fighting. He back-fired across the mountain between Brooks Run and the right hand branch of Lick Island Run across to Grove Run, thus cutting off the fire on the western side. Very little fighting was done along the eastern side of the fire because the wind drove it down to the wagon road and farms along First Fork in very short order and it burned itself out on that side before we had a chance to do any fighting. The last of the fire was finally extinguished on Sunday, May 14, after 6,000 acres of State land and 1,000 acres of private land had been burned over.

A few days after the fire, I went over the burned area to determine as well as possible the amount of damage done. Where the fire burned most fiercely, nearly everything was killed, but there was not much valuable growth on that part of the burned area. Where the fire backed up against the wind, it burned only the surface leaves and killed only the smaller sprouts up to one-half inch in diameter. Most of the valuable growth is two inches or more in diameter and does not seem to have suffered much from the fire. I think \$1.00 per acre, or \$7,000.00 for the entire area burned, is a conservative estimate of the damage.

This fire was incendiary, beyond doubt, but we have no evidence to prove the guilt of the persons whom we suspect of setting the fire.

Another fire, occurring on October 2, 1916, is worthy of note. It appears certain that this fire was caused by a bee hunter who may have gotten several dollars' worth of honey for his trouble and carelessness. The fire burned for ten days, breaking out afresh day after day, until over 700 acres had been burned. It cost the State \$490.34

to have this fire extinguished, and the loss is reported as \$2,650. It is time for our people to understand that a bill of over \$3,000.00 is rather high for several pounds of honey. Yet shiftless individuals are shielded in their custom of carelessly smoking out bees.

Another fact worth noting is that, notwithstanding our efforts at publicity among sportsmen, they stand third in rank as to number of fires, fourth in rank as to acreage burned over and damage done, and it cost more to put out their fires than those of any other class. Very few of the fires were caused by fishermen, so hunters have the sole glory, if it be any glory to them to be responsible for such a tremendous loss and handicap to their particular sport.

MEETINGS ATTENDED

January 18. Boston. Annual Meeting American Forestry Association.

January 19. Boston. Annual Meeting Eastern Foresters. Visited lumber operations carried on by State Forester of Massachusetts in connection with gypsy moth work.

January 20-21. Boston. Conference of Collaborators in Fire Protection under the Weeks' Law.

April 14. Harrisburg. Pennsylvania Conservation Association and allied interests in behalf of the Cook Park.

June 27-29. Reading. Summer Meeting of Pennsylvania Forestry Association, and summer meeting of Pennsylvania Foresters.

July 10-11. Oil City. Annual Meeting of United Sportsmen of Pennsylvania.

September 5-7. Conneaut Lake. Annual Meeting of Wild Life League.

October 31. Harrisburg. Governors Conference on Flood Control.

November 29. Harrisburg. Governor's Conference on Water Pollution.

December 11. Philadelphia. Annual Meeting Pennsylvania Forestry Association.

PAPERS AND REPORTS PREPARED

Review of reports of forest fire on Medix Forest as submitted by Pennsylvania Railroad foresters and State Forester Chas. E. Zerby.

Present Forest Fire Organization in Pennsylvania—Weeks' Law Conference.

Larch.—"In the Open" magazine.

Tree Planting along Roadsides.—"In the Open" magazine.

Tulip Tree.—"In the Open" magazine.

Collection of Tree Seeds.—"In the Open" magazine.

Observation of Arbor Day.—"In the Open" magazine.
 Department Circular 16.—Forest and Woodlot Tree Planting.
 Synopsis of 1915 forest fire data for Department Report.
 Protection of the Forests. Pennsylvania Arbor Day Manual.
 Influence of Forest upon Stream Flow. Department use.
 Report to be referred to committee appointed at Hazleton meeting.
 Report on damage done to Pine Grove Forest by forest fire of May 6, 1916.
 Report on examination of property of American Zinc & Chemical Co., Langeloth
 Suggestions for future tree and forest development.
 Protection of our Forests. Journal of the Engineers' Society of Pennsylvania.

ADDRESSES

January 6. Altoona. Chamber of Commerce. About 70 in attendance. "What should be the Attitude of the Chamber of Commerce to Forestry in Blair County?"
 February 16, 23, March 1, 8, 15, 22, April 5, 12. Ambler. Womens' School of Horticulture. About 25 in attendance at each meeting. Eight lectures on "Care of Farm Woodlot."
 February 22. Altoona. Men's Bible Class, Second U. B. Church. About 100 in attendance. "What Forestry Means."
 March 24. Lewistown. Sportsmen's Association and Boy Scouts. About 75 in attendance. "Influences of Forests."
 March 28. Bedford. Civic Club and Parent-Teachers Association. About 100 in attendance. "Care of Trees."
 March 29. Bedford. School children of all grades. "Care and Study of Trees."
 April 28. Selinsgrove. Susquehanna University. Arbor Day exercises. About 50 in attendance. "The Meaning of Arbor Day."
 May 17. Ambler. Women's School of Horticulture Conference. About 75 in attendance. "Care of Trees."
 July 11. Oil City. Annual meeting of United Sportsmen of Pennsylvania. About 40 in attendance. "Forest Protection in Relation to Game and Fish."
 August 2. Mont Alto. State Forest Academy students. About 30 in attendance. "Forestry in Pennsylvania."
 August 3. Mont Alto. State Forest Academy students. About 30 in attendance. "Protection of Forests from Fire in Pennsylvania."
 August 24. Mont Alto. Graduation Exercises State Forest Academy. About 150 in attendance. Greetings to graduating class.
 September 5. Conneaut Lake. Annual meeting of Wild Life League. About 150 in attendance. "Protection of Forests from Fire."
 September 8. Bradford. Timber owners or lessors. About 15 in attendance. "Forest Protection and Organization of Protective Association."
 September 16. Altoona. Blair County Sportsmen. About 30 in attendance. Forest Protection. Illustrated.
 September 28. Hazleton. Timberland owners. About 20 in attendance. "Forest Protection and Organization of Protective Association."
 December 11. Philadelphia. Pennsylvania Forestry Association. About 20 in attendance. Work of Bureau of Forest Protection.

MISCELLANEOUS.

March 6. Marked trees to be removed on association and park grounds, Mount Gretna.

March 25. Inspected Town Park at Mifflinburg with Committee of Civic Club.
 April 7. Marked trees on Chataqua grounds, Mount Gretna.
 June 21. Inspection of white pine at Elizabethtown for Blister rust.
 July 28. Inspected white pine at Masonic Home, Elizabethtown, for blister rust.
 July 28. Looked over part of Chataqua grounds, Mount Gretna, for gooseberry plants.
 August 23. Examined fire tower sites on Mont Alto and Caledonia Forests.
 August 5-16. Reorganizing fire warden system in western counties.
 August 16-17. Examination of property of American Zinc & Chemical Company, Langeloth, Pa.
 September 30. Set up lantern slide exhibit at Scranton.
 November 8-9. Examined sites for fire towers on White Deer and Buffalo Forests.
 November 20-22. Reorganizing fire warden system in Chester county.
 December 21. Reorganizing fire warden system in Bucks county.

FINANCIAL REPORT

Deficiency Appropriation for fires previous to June 1, 1915,	\$17,500 00
Expenditures, January 1, 1916,	\$15,336 88
14 bills approved during 1916,	323 60 15,660 48
Balance available January 1, 1917,	\$1,839 52
Appropriation, June 1, 1915 to June 1, 1917,	\$45,000 00
Expenditures, January 1, 1916,	\$4,403 85
1915 expenses approved and paid during 1916:	
Fire extinction,	\$81 63
Protective association expenses,	16 01
Foresters' expenses,	23 00 120 64
1916 expenses approved and paid during 1916:	
Salary, Chief Forest Fire Warden,	\$2,499 96
Salary, clerk,	1,000 00
Expenses, Chief Forest Fire Warden,	388 11
Expenses, clerk,	302 41
Expenses, foresters,	788 59
Expenses, Local Fire Wardens,	640 14
Tools,	67 66
Postage,	575 00
Gummed stickers (educational),	112 20
Patrol—direct from fire fund,	1,008 36
Overdraft on patrol salary (Returned to State Treasurer),	41 60
Expenses Protective Associations,	842 99
Fire extinction,	13,080 85 \$21,347 87
Total expenditures,	\$25,872 36
Balance available January 1, 1917,	\$19,127 64

Detailed Statement of Expenses Incurred in Connection With Extinction of 1916 Fires, Bills for Which Were Approved During 1916.

County.	Labor.	Transportation.	Meals.	Telephone.	Affidavit.	Tools.	Postage.
Adams,	\$98 91		\$2 25		\$1 05		
Armstrong,	36 60				1 50		
Bedford,	435 24	\$4 25	6 95		9 50		\$0 25
Berks,	285 33	11 75	75	40	6 25		03
Blair,	514 52	42 75	3 85		7 50		02
Bradford,	8 75	8 00			25		
Bucks,	19 30				75		
Butler,	9 60				25		
Cambria,	123 80	4 70			4 75	1 60	
Cameron,	149 40	2 15	42 75		2 25		
Carbon,	204 86	20 65	2 00		4 25		
Centre,	1,305 24	167 81	76 43	50	6 25		
Chester,	50 27	3 00			75		
Clarion,	12 25	60			2 50		
Clearfield,	163 20	4 00	8 25		2 50	1 00	
Clinton,	494 87	17 50	10 45	20	5 33		
Columbia,	174 30	11 00	1 00		1 58		
Crawford,	1 50	3 00			25		
Cumberland,	168 54	4 01			2 50		\$9
Dauphin,	299 94	3 25	75		4 00		
Elk,	437 82	114 80	22 71		1 37		1 60
Fayette,	297 63	13 70	50		4 25		1 02
Forest,	21 30	1 50			50		
Franklin,	405 59	24 75	25 13		3 75	8 50	
Fulton,	198 31	4 75	2 15	40	1 45		
Huntingdon,	778 20	97 54	26 03	94	5 75		
Indiana,	76 95	2 00			1 00		
Jefferson,	2 93				25		
Juniata,	186 55	13 25	3 50	21	3 25		
Lackawanna,	220 22	5 50			2 00		
Lancaster,	57 31	6 00			50		
Lebanon,	52 85	2 00			50		
Lehigh,	71 41	1 00			1 50	1 50	
Luzerne,	762 60	88 87			8 75		09 1
Lycoming,	383 88	30 15	19 48		4 75		
McKean,	57 90				51		
Mifflin,	297 53	11 26	12 90	10	1 82		
Monroe,	120 12	34 95			3 91	7 65	
Northumberland,	75 88	1 50			2 17		
Perry,	124 59	9 25			3 00		
Pike,	120 55	62 30	1 25		2 09		
Potter,	613 25	22 50	3 50	60	5 74		
Schuylkill,	346 44	16 00			6 50		
Snyder,	224 73	10 44	1 34		1 71		
Somerset,	118 13	11 00			4 00		
Sullivan,	169 20	3 90	2 76		4 50		
Susquehanna,	2 70				2 25		
Tioga,	191 43	6 50	3 43		2 25		
Union,	154 08	10 46	7 97	05	1 25		
Warren,	51 23	4 75			1 50		
Wayne,	98 65	11 00			1 25		
Westmoreland,	298 85	10 75	4 75		5 50		
Wyoming,	67 65	4 00			1 25		
York,	21 18				50		
	\$11,664 43	\$944 09	\$292 83	\$3 40	\$151 25	\$11 75 *8 50	\$4 00

*Medical attention.

Grand total, \$13,080.85.

Detailed Statement of 1916 Expenses Incurred by Protective Associations, Submitted and Approved During 1916.

	Printing and stationery.	Postage.	Secretary's allowance.	Travel and telephone charges.	Towers and telephone lines.	Tools.	Patrolmen.	Office rent.	Affidavits.	Paid by association.	Paid by State.
Central Pennsylvania Forest Fire Protective Association,	\$66 18	\$9 15		\$20 00		\$23 33	\$112 75	\$33 00	\$2 00	\$133 23	\$133 18
McKean County Protective Fire Association,	17 25	11 53							25	17 04	17 04
Poccono Protective Fire Association,	90 80	36 97		4 55	59 07	37 27	1,090 00		2 00	691 80	692 77
	\$174 23	\$57 70	\$68 91	\$24 55	\$59 07	\$60 60	\$1,202 75	\$33 00	\$4 25	\$342 07	\$342 99

It is not likely that there will be any additional charges against the deficiency appropriation.

The fact that there is still over \$19,000.00 available from the current appropriation is due to two things. The spring season was unfavorable for fires, except for several short periods in April and May. Notwithstanding this fact, 506 fires were reported. The fall season was much more favorable to fires, and 507 were reported. Over 100 fires were reported from all over the State as having occurred on the 6th, 7th, and 8th of December. Had there been continuous dry spells in spring as in the spring of 1915, more serious results might have occurred.

There is little difference in the number of fires reported in 1916 and in 1915. Evidently organization, promptness on the part of wardens, and general education, helped to keep down expenses. The total expenses in 1915 were over \$30,000.00, while in 1916 they have been close to \$20,000.00.

It will be observed that there is a discrepancy between the cost of fire extinction as given in the financial statement and the cost of fire extinction as given in Table II. This is due to the fact that the table includes reports of fires, the bills for which were approved subsequent to January 1, 1917, and which will be accounted for in the 1917 financial statement.

FOREST PROTECTION BUDGET—JUNE 1, 1917 TO JUNE 1, 1919.

1. Salary of Chief Forest Fire Warden, \$2,500 per year,	\$5,000 00	
2. Salary of clerk, \$1,200 per year,	2,400 00	
3. Traveling expenses for Chief Forest Fire Warden and clerk,	1,500 00	
4. Office expenditures,—postage and extra help,	2,000 00	
5. Eight District Fire Wardens:		
Salaries, \$1,500.00 per year,	\$24,000 00	
Expenses,	8,000 00	32,000 00
6. Expenses ex-officio, special, and local forest fire wardens:		
Fire prevention, extinction, and performance of other duties, ..	80,000 00	
7. Observers and patrolmen (salaries and expenses) (80),	16,000 00	
8. Towers, telephone connections, and telephone rentals,	15,000 00	
9. Fire fighting equipment,	5,000 00	
10. Co-operative agreements,	10,000 00	
11. Publicity features,	2,000 00	
12. Investigation, report and eradication of dangerous forest fungi and insects,	15,000 00	
Total,	\$185,000 00	

Items 1 and 2 need no explanation.

Item 3. Traveling expenses for the Chief Forest Fire Warden will have to be heavy for the next two years if a forest fire prevention system is to be worked out for Pennsylvania. The fire warden organization will have to be looked after more in detail until district fire wardens can be drafted into duty; fire hazards will have to be investigated and ordered to be abated; causes of forest fires will have to be checked and investigated more than ever before; sites for fire towers must be selected carefully; forest mapping must be started, checked, and finished. Needless to state, \$60.00 per month for these expenses will hardly be sufficient.

Item 4. It is one thing to choose good men for an organization and another to keep in touch with them. In order to keep the fire wardens awake to their opportunities of service and their duties, it is necessary to send circulars to them from six to eight times per year. From time to time other classes of citizens must be circularized. Forms must be sent out. Inquiries require stamped return envelopes. Ordinary correspondence is becoming heavier as the work proceeds. From \$1,000 to \$1,500.00 will be needed in the next two years for postage alone.

At times, the office work becomes too heavy for one clerk, and a stenographer whose time is only partly devoted to the work of this Bureau. Other help will have to be available if good work is to be expected.

Item 5. Under present conditions all of the 21 fire districts but nine receive some supervision by reason of our State foresters doing this work in addition to their other duties. The results are not satisfactory and conditions ought to be remedied as soon as possible. However, we believe that if we can obtain enough appropriation to locate eight district fire wardens in the next two years at annual salaries of \$1,500.00 each and with annual expenses amounting to \$500.00, we can present enough results by that time to prove the value of completing the organization as planned.

The Chief Forester of British Columbia stated the necessity of field supervision very clearly. He says:

"Because of lack of field supervision, more money is wasted in fire protection today than is used economically. Fire wardens are nearly all temporary men, and if one does not give them supervision and training, and does not try to keep the good man from year to year, one cannot get the results desired. In the first fire protection services of Canada, far more wardens were wasting money than were making good use of it. Unless we have good permanent rangers year after year we will not get the good results because we have large areas to protect with very small sums of money."

Item 6. For the last eight years the average cost for fire extinction alone has been close to \$28,000.00. If a serious fire season, or several of them, come upon us, we must be prepared for the emergency, and \$60,000.00 is not too much to have available for this purpose.

The fire wardens need to be trained in co-operative methods, fire extinction, detection of causes, and other things in connection with their work. They are also expected to do a certain amount of publicity work which should not be done entirely upon their own time. Meetings of fire wardens are an important factor in the efficiency of our system and must be held more or less regularly. \$20,000.00 for two years is a small figure to cover these expenses.

Item 7. Prevention is better than extinction. Patrolmen are a part of the prevention system being worked out. So also are fire towers and observers for duty thereon. The employment of anything less than 100 such men in this great Commonwealth, with over seven and one-half millions of acres of forest land to protect seems ridiculous, and yet \$16,000.00 for two years will permit us to employ only 80 such men at a monthly salary of \$50.00 and an average term of employment of two months per year. The work of these men will return to the Commonwealth many times the value necessary to employ them.

Item 8. With the forest land situated as it is, there will be necessary probably 150 primary towers from which to observe fires promptly in order to protect properly the interests at stake. These towers will be of advantage to many people for many purposes. They will average in cost from \$200 to \$300. Many of them will be built by joint subscriptions from the State and from local people. We have figured that with the amount listed we can build about 40 such towers and connect them with some telephone system so that information of the origin of a fire may be quickly announced to the wardens, and consequently quickly extinguished.

Item 9. No fire warden or crew of men can do quick and efficient work at fire extinction without tools, any more than a city fire department can do its work without equipment. We have been expecting our men to furnish their own tools with the result that fire extinction always costs considerably more than it should, and damages are consequently increased. \$5,000.00 will not permit of an average expenditure of \$4.00 for each forest fire warden. It will hardly be sufficient to furnish each warden with two torches and two axes.

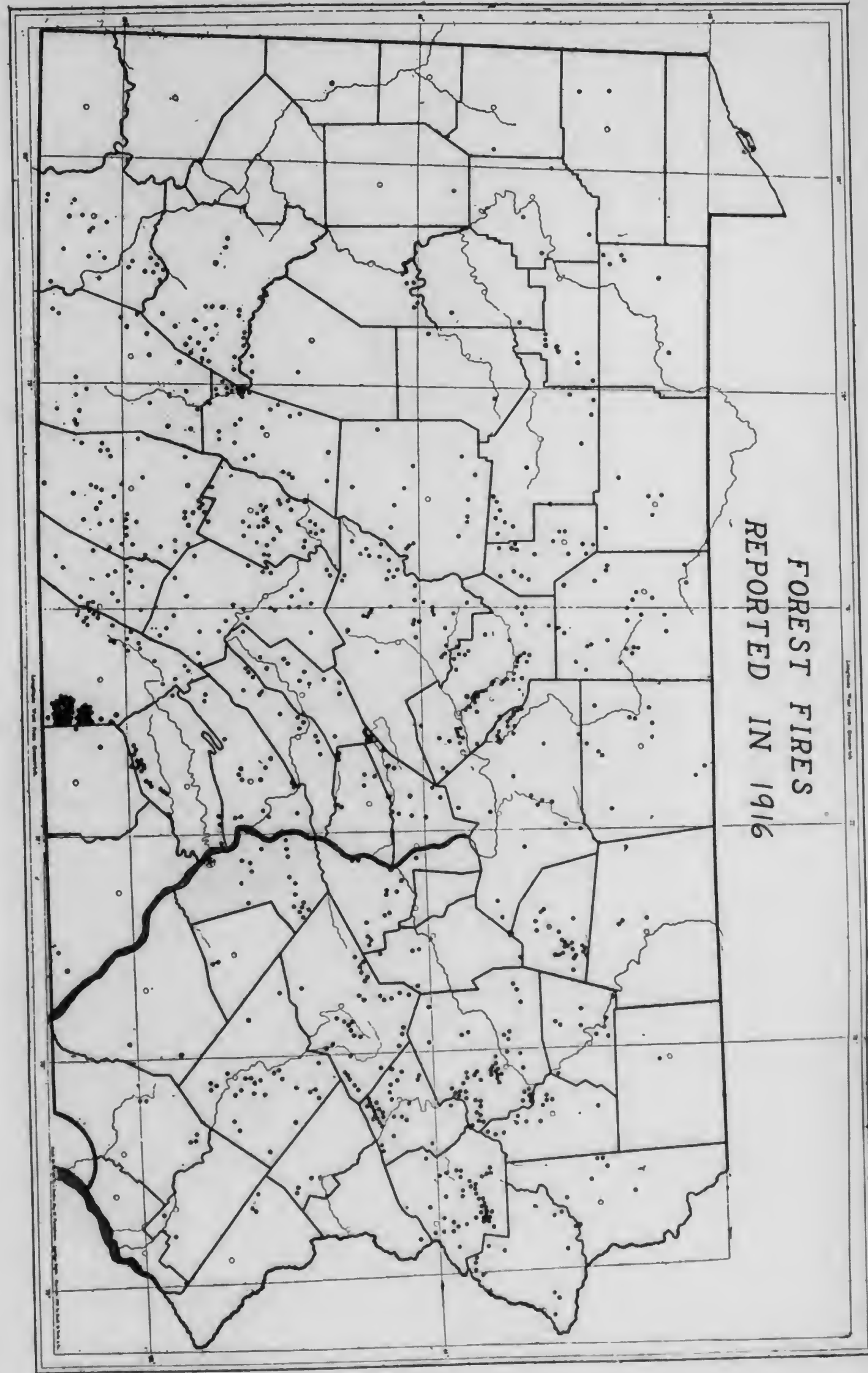
Item 10. There are now three protective associations with which we are co-operating, and all three are growing because of the good work they are doing. As they increase in membership, they increase their expenditures and we must meet their amounts. Other organizations will be formed within the next two years and \$10,000.00 is not likely to be sufficient to meet the needs of these agreements.

Item 11. Every cause must be kept before the people in all sorts of ways and in all sorts of places. Business firms do not have to be told that it pays to advertise, neither do people who know the forest problem. There must be educational and publicity methods used by our Department for years to come until fire prevention becomes second nature. Simple printing does not answer all needs so a fund must be available for the purchase of other features, or for the carrying out of other methods of publicity. \$1,000.00 a year for this purpose will yield many times its face value in good results.

Item 12. We have faced and suffered a tremendous loss through the chestnut blight disease because it was not detected and checked when it might have been possible to save much of the loss. We are now face to face with another fungus disease. This time it attacks the white pine. Unless carefully kept under control, it will wipe out our white pine. Insect troubles are also on the increase and there must be an attack made against these forces. \$15,000.00 is not sufficient for this work, but will at least start it and get things in shape for some kind of success in the near future.

TABLE I. Detailed Statement of Forest Fires in 1916.

Date.	Township.	Acres.	Damage.	Cause.	Cost of Extinction.		Warden.
					Fire Fund.	Other Sources.	
ADAMS COUNTY.							
April 18	Hamiltonban.	30	\$160	Berning building.	\$10 65	\$6 16	Staley.
29	Franklin.	23	28	Incendiary.	5 25	.....	Hall.
May 5	Menallen.	5	2	Incendiary.	4 22	.....	Williams.
6	Menallen.	60	600	Incendiary.	13 93	.....	Williams.
19	Menallen.	4	4	Incendiary.	1 98	.....	Williams.
24-21	Menallen.	82	100	Incendiary.	12 68	.....	Williams.
21	Menallen.	313	650	Incendiary.	46 67	25 24	Williams.
Oct. 30	Menallen.	10	10	Incendiary.	1 75	11 98	Conklin.
Nov. 30	Hamiltonban.	5	52	Children (*).	5 44	.....	Strausbaugh.
		526	\$1,606		\$107 65	\$13 38	
ARMSTRONG COUNTY.							
May 1	Madison.	50	\$150	P. R. R. (?)	\$5 95	.....	Paine.
21	Madison.	55	100	P. R. R. (?)	5 83	.....	Paine.
21	Madison.	15	25	P. R. R. (?)	1 02	.....	Paine.
Oct. 15	Mahoning.	4	17	Unknown.	.....	\$1 65	Shoemaker.
26	Madison.	20	100	Unknown.	8 95	.....	Shoemaker.
28	Madison.	30	175	P. R. R. (?)	1 75	10 00	Loenz.
29	Madison.	3	20	Hunters.	5 83	.....	Paine.
29	Madison.	20	200	Hunters.	2 07	.....	Paine.
Nov. 21	Madison.	25	125	P. R. R. (?)	4 33	3 60	Loenz.
		222.2	\$917	P. R. R. .	2 37	9 60	Loenz.
					\$38 10	\$24 35	
BEDFORD COUNTY.							
April 1	Londonderry.	150	.....	Unknown.	\$4 15	.....	Mays.
16	West Providence.	3.5	\$10	Boys (a).	3 55	.....	Weicht.
16-17	Colerain-Monroe.	125	100	Unknown.	7 30	\$8 60	Ivers.
17	Monroe.	7	.....	Burning brush (b).	6 33	.....	Diehl.
18	Bedford.	.....	.....	Unknown (c).	.....	12 00	Barley.
18	West Providence.	15	53	Unknown (d).	2 53	.....	Weicht.
18	East St. Clair.	3	30	Sawmill ?	2 07	.....	Stambaugh.





May	1	South Woodbury,	3	.....	Burning brush (f),	5 30	1 55	Mauk,
	2	East Providence,	150	8	Unknown,	5 60	4 30	Tenley,
	8	Broad Top,	3	100	H. & B. T. (?),	22 50	4 30	Byers,
	10	Colerain-Monroe,	70	150	Unknown,	6 40	31 69	Snyder,
	11	Bloomfield,	10	500	Burning brush (g),	33 05	4 80	Diehl,
	11-12	Southampton,	200	1,100	Burning brush (h),	25 47	1 03	Heming,
	11-13	Bedford,	500	150	Burning brush (i),	21 20	1 50	Weicht-Byers,
	12	West Providence,	75	85	Unknown,	7 35	1 03	Simpson-Hixson,
	12-13	East Providence,	125	85	Unknown,	6 55	1 50	Brumbaugh,
June	1	Woodbury,	75	80	Campers,	23 95	1 50	Smith,
	2	Hopewell,	75	80	Incendiary,	22 15	1 03	Brumbaugh,
Oct.	17	Woodbury,	2	.....	Unknown,	7 45	1 50	Mays,
	19	South Woodbury,	2	.....	Unknown,	13 85	1 50	James,
	29-4	Londonderry,	50	2	Traction engine (?),	17 04	3 00	Barkman,
	30-3	Southampton,	50	2	Hunters,	2 93	3 00	Workman,
	31-1	Monroe,	200	2	Smoker,	7 30	2 10	Simpson,
Nov.	2-3	Liberty,	50	100	Unknown,	7 15	2 70	Weicht,
	2-3	East Providence,	54	160	Unknown,	5 95	.....	Tenley,
	2-3	West Providence,	1	20	Unknown,	17 05	.....	Diehl,
	2	West Providence,	40	70	Unknown,	2 35	.....	Snyder,
	3	West Providence,	14	100	Unknown,	17 05	.....	Ickes,
	4	Broad Top,	50	25	Unknown,	28 08	.....	Ford,
	9	Monroe,	100	310	Unknown,	2 50	.....	Howser,
	9	Bloomfield,	25	100	Unknown,	13 75	.....	Howser,
	11	King,	200	100	Unknown,	5 05	30	Heming,
	11-12	Broad Top, East Providence,	2	40	H. & B. T.,	11 90	.....	Mays,
	15-16	Colerain,	200	100	Hunters,	4 45	.....	Brumbaugh,
	17	Liberty,	50	100	Unknown,	7 45	.....	Agnew,
	17-18	Colerain-Bedford,	200	100	Unknown,	6 03	90	Byers,
	18	Bedford,	200	100	Unknown,	7 75	75	McKinney,
	19	Londonderry,	100	100	Unknown,	20 24	.....	Brumbaugh,
	19-20	Londonderry,	300	100	Hunters,	\$483 16	\$79 72	
	21	Woodbury,	40	100	Unknown,			
	27	Bedford,	40	100	Unknown,			
	5	Bloomfield,	80	300	Unknown,			
Dec.	5-6	Londonderry,	75	135	P. R. R.,			
	7-7	Southampton,	350	175	Hunters,			
	7-8	Junata,	4	.....	Unknown,			
	7-8	Woodbury,	400	.....	Logging engine (k),			
			4,986	\$4,703				

Note (a)—Settlement demanded of parents.
 Note (b)—Attorney General refused to act.
 Note (c)—Attorney General refused to act.
 Note (d)—Bill outlawed because not presented within sixty day limit.
 Note (e)—Attorney General refused to act.
 Note (f)—Attorney General refused to act.
 Note (g)—Attorney General refused to act.
 Note (h)—Attorney General refused to act.
 Note (i)—Attorney General refused to act.
 Note (j)—Attorney General refused to act.
 Note (k)—Settlement demanded of owner of engine but not yet adjusted.

TABLE I—Continued.

Date.	Township.	Acres.	Damage.	Cause.	Cost of Extinction.		Warden.
					Fire Fund.	Other Sources.	
BERKS COUNTY.							
Jan. 28	Cumru.	15	\$5	Unknown.	\$3 35	\$3 55	McNeal.
April 7	Mullenberg.	25	50	Unknown.	1 60		Fisher.
15	Alsace.	?		Smoker (?)			McNeal.
15	Malden.	6	12	Unknown.	2 52		Roberts.
18	Hereford.	30	372	Burning brush.	16 24		Mensch.
18	Ruscombmanor.	30		Unknown.	5 38		Noll.
18	Malden.	4	40	P. & R. (?)	68 29		Roberts.
18-19	Greenwich.	700	2,000	P. & R. (?)	5 81		Hein.
May 9	Tilden.	6	12	Unknown.	15 68		Bailey.
9-13	Mullenberg.	19	5	Unknown.	138 90		Fisher.
11	Albany-Windsor.	800	1,000	Unknown.	4 10		Petticofer.
12	Albany.	4	40	Unknown.	8 65		Snyder-Martin-Schlegel.
12	Lower Alsace.	2	2	Unknown.	3 28		Altenderfer.
12	Ontelaunce.	200	1,000	P. & R. (?)	3 26		McNeal.
12	Albany.	2	15	P. & R. (?)	62		Fisher.
12	Longswamp.	10	100	Unknown.	1 75		Altenderfer.
13	Greenwich.	2		Unknown.	3 70		McNeal.
21	Exeter.	5	3	Smoker (?)	1 45		Evans.
Oct. 26	Mullenberg.	5	15	Unknown.	4 52		Guldin.
Nov. 2	Robeson.	8	46	P. & R. (?)	8 15		Evans.
3	Robeson.	4	5	P. & R. (?)	1 15		Ebling.
19	Earl.	2	300	Unknown.			Fisher.
29-30	Robeson.	30	80	Hunters.			Mext.
Dec. 4-7	Leibel.	40	10	Railroad.			
8	Mullenberg.	2	10	Unknown.			
	Earl.	2					
		2,225.4	\$5,112		\$205 71	\$14 08	
BLAIR COUNTY.							
April 16	Logan.	30	\$5	P. R. R.	\$2 42		Chamberlin.
18-19	Frankstown.	400	550	Lumbering (a).	2 30		Chamberlin.
18-19	Huston.	500		Stave mill (?)	23 95		Hyle.
18-19	Woodbury.	1,000	2,000	Stave mill (b).	34 85		Maloney.
30	Antis.	25		Boys (?)	4 70		Keller.

May 1	Logan.	450	2,250	Burning brush (c).	7 30	\$17 20	Goetz.
6	Frankstown.	100	11,000	Lumbering (d).	191 00	12 45	Hyle.
9-14	Logan-Frankstown.	11,000	500	Unknown.	10 45	6 00	Chamberlin.
11	Logan.	300		P. R. R.	7 92		Yost.
11	Antis.	20		Unknown.	4 90		Keller.
12	Logan.	1		Burning brush (e).	5 15		Goetz.
12	Logan.	1		Unknown.	7 22		Taneyhill.
13	Antis.	40	25	Unknown.	3 25		Keller.
14-15	Frankstown.	20		Railroad (?)	5 50		Hyle.
14-15	Logan.	4		Burning brush (?)	2 50		Goetz.
8	Logan.	50		Boys (f).			Goetz.
9	Junata.	5		Unknown.			Ritcher.
15	North Woodbury.	4		Hunters.	1 20		Brumbaugh.
18	Antis.	5		Unknown.	3 35		Keller.
18-19	Logan.	40		Hunters.	13 65		Goetz.
26-27	Frankstown.	100	50	Unknown.	21 13		Goetz.
26-27	Frankstown.	75	100	Hunters (?)	6 70		Garner.
26-27	Tyrone.	200	150	Hunters.	12 55		Fleck.
28-30	Tyrone.	600		Hunters.	33 55		Miller.
29-30	Logan.	70	35	Unknown.	14 32		Goetz.
29-30	Tyrone.	600	600	Unknown.	29 95		Fleck.
29-30	Catharine.	150	25	Road roller (g).	11 25	48 00	Hyle.
2	Logan.	20		P. R. R.			Goetz.
9	Logan.	50		Unknown.	6 50		Keller.
11	Antis.	1	5	Hunters.	1 80		Gold.
19-22	Frankstown.	1,000	250	Unknown.	63 40		Acker-Brumbaugh.
21-22	Huston.	40	75	Mining engine (h).	3 25		Linsentfer.
21-22	Greenfield.	15	65	Burning building (i).	4 15		Goetz.
2	Logan.	50	50	Unknown.	3 12		Bagshaw.
6	Logan.	7	35	P. R. R.	4 90	5 60	Goetz.
6	Frankstown-Catharine.	10	25	Burning brush (j).	9 50	8 60	Hyle.
6-7	Catharine.	70	18	Unknown.	3 57		Keller.
7	Antis.	25	100	Lumbering (a).	65 90	1 50	Gold.
7	Frankstown.	300	200	Unknown.	7 63		Kapp-Yost-Segulin.
7-9	Logan-Antis.	500	70	Unknown.	1 75		Bagshaw.
7-9	Catharine.	500		Lumbering (a).			Gold.
9	Frankstown.	6					
		17,977	\$19,743		\$536 69	\$102 56	

Note (*)—See also fire of same date in Schuylkill county.
 Note (a)—Prosecution authorized by Attorney General. Case now pending.
 Note (b)—Suit authorized by Attorney General. Case now pending.
 Note (c)—Attorney General refused to act. Warden's bill of \$17.20 paid by person responsible.
 Note (d)—Attorney General refused to act. Settlement demanded of person responsible.
 Note (e)—Settlement demanded of person responsible but not yet finally adjusted.
 Note (f)—Boys and their parents called before fire warden and truant officer at Boy Scout Headquarters and reprimanded. No proof that the second day's fire was caused by the first.
 Note (g)—Six dollars of warden's bills paid by county commissioners. Persons now in jail.
 Note (h)—Settlement demanded from company responsible.
 Note (i)—Building fired by upsetting of a lamp in a drunken brawl.
 Note (j)—Settlement demanded from person responsible.
 Note (k)—See also fire of same date in Cambria county.

TABLE I—Continued.

Date.	Township.	Acres.	Damage.	Cause.	Cost of Extinction.		Warden.
					Fire Fund.	Other Sources.	
BRADFORD COUNTY.							
Aug. 23	Burlington,	2	\$20	Unknown,	\$17 00	\$0 75	Montgomery.
Nov. 7	Monroe,	25	7	L. V. (?),		1 00	Harbeson.
Dec. 1	Monroe,	20	5	L. V.,		1 00	Harbeson.
		47	\$32		\$17 00	\$2 75	
BUCKS COUNTY.							
April 12	Buckingham,	14	\$14	P. & R.,	\$3 50	.....	Ewers.
April 30	West Rockhill,	9	60	Unknown,	4 10	.....	Plank.
Oct. 28	West Rockhill,	10	.....	Hunters (*),	12 00	.....	Plank.
Dec. 7	Milford,	2	.....	Unknown,	45	.....	Buck.
		35	\$74		\$20 05	.....	
BUTLER COUNTY.							
Oct. 7	Washington,	60	.....	Railroad (?),	\$9 85	.....	Seaton.
CAMBRIA COUNTY.							
April 15	Lower Yoder,	2.5	.....	Boys, .....	.....	\$1 80	Weller.
May 1	Blacklick,	.5	\$5	P. R. R. (?),	\$2 01	.....	Gotshall.
1	Blacklick,	.5	5	P. R. R. (?),	2 69	.....	Gotshall.
1	West Taylor,	200	200	Burning brush (†),	33 40	3 00	Weller.
1-2	Jackson,	2	20	Sawmill,	2 25	6 00	Weller.
9	Chest,	3	.....	Lightning,	8 95	.....	Gill.
10	Lower Yoder,	2.5	.....	Unknown, .....	.....	3 90	Weller.
11	Jackson,	1.5	7	P. R. R.,	5 95	4 20	Gotshall.
11	Yower Yoder,	1	.....	P. R. R., .....	.....	45	Weller.
11	Adams,	1	1	Campers,	1 15	.....	Jamison.
12	White,	4	5	Unknown,	2 35	.....	McKee.
13	Cambria,	10	10	P. R. R.,	1 45	60	Evans.
13	Cambria,	.1	1	Children,	85	.....	Jamison.
14	Summerhill,	25	2,000	Unknown (†),	7 75	6 00	Mulhollen.
21	West Taylor,	7.5	.....	P. R. R.,	9 10	.....	Weller.
21	West Taylor,	2	.....	P. R. R.,	1 80	.....	Weller.

July 29	Jackson,	?	175	Smoker,	1 15		Diehl.
Oct. 16	Upper Yoder,	2	5	Hunters,	4 00		Weller.
Oct. 25	West Taylor,	1	5	Unknown,	1 95		Ludwig.
Nov. 29	Richland,	40	40	Railroad (?),	1 70		Seguin.
Nov. 2	Dean,	3	5	Altoona Northern,	95		Seguin.
3	Dean,	1	2	Altoona Northern,	7 74	60	Weller.
9	Lower Yoder,	3.5	95	Boys,	10 50		Fresh.
9-12	Jackson,	10	50	Hunters,	2 33		Weller.
12	Lower Yoder,	?		Rubbish fire,	8 05		Cassidy.
12	Washington,	2	2	Unknown,	5 05	1 50	Weller.
18-19	Upper Yoder,	5	5	B. & O.,	4 90	2 10	Freidhof.
27	Cresson,	75		P. R. R.,	3 55		Stutzman.
6	Croyle,	5		Unknown,	2 45		Seguin.
7	Dean,	5	600	Altoona Northern,	3 75		Kapp-Yost-Seguin.
7-9	Dean,	200		Unknown (\$),			
		614.7	\$3,233		\$139 75	\$30 15	
CAMERON COUNTY.							
Jan. 24	Lumber,	65	\$85	Railroad (?),	\$3 25		Horning.
April 7	Shippin,	25	25	Unknown,	6 10	\$1 20	Evans.
7	Shippin,	?	50	Burning brush (a),	9 90	1 60	Evans.
7	Gibson,	?		P. R. R.,	68		Nyce.
10	Portage,	2		P. R. R.,		1 00	Evans.
15	Gibson,	7		P. R. R. (?),	98		Nyce.
18-19	Gibson,	50		Unknown,	4 59		Nyce.
6	Shippin,	10		Unknown,	5 05	1 60	Powell.
6-7	Portage-Lumber,	29	80	P. R. R.,	3 25	4 00	Pitts.
11-14	Grove-Gibson,	75		Incendiary (d),	1 62	4 00	Evans.
11-14	Shippin,	7,000	7,000	Unknown,	78 70	195 90	Horning.
11-16	Shippin,	300		Unknown,	18 43		Evans.
Aug. 21	Gibson,	5	25	Lumbering (b), (c),	64 00	105 00	Peasley.
Sep. 12	Shippin,	135	200	Burning brush (c),			Zerby.
Oct. 18-20	Shippin,			Unknown,		12 32	Evans.
		8,297	\$7,445		\$196 55	\$296 62	
CARBON COUNTY.							
April 5	East Penn,	1	\$5	L. V.,	\$1 78	\$0 30	Kemmerer.
7	East Penn,	18	125	L. V.,	4 63		Kemmerer.
7	East Penn,	125	1,250	L. V.,	4 53	15	Kemmerer.
12	East Penn,	4	30	L. V.,	2 83		Kemmerer.

Note (*)—Suspected parties written to and cautioned. Evidence not sufficient to hold.

Note (†)—Settlement demanded of person responsible. Not yet adjusted.

Note (‡)—Large loss due to fact that fire destroyed a sawmill.

Note (§)—See also fire of same date in Blair county.

Note (a)—Person responsible excused on account of extreme poverty.

Note (b)—See also fire of same date in Elk county.

Note (c)—Fire burned beneath the surface in mucky soil during very dry period.

Note (d)—See page 74.

TABLE I—Continued.

Date.	Township.	Acres.	Damage.	Cause.	Cost of Extinction.		Warden.
					Fire Fund.	Other Sources.	
CARBON COUNTY—Continued.							
16	Mauch Chunk-Penn.	300	100	Burning brush (*).	41 75	3 00	Boyer.
April 16	Forest-Franklin.	50	500	Unknown.	20 20		Mehrkam.
	Lower Towamensing.	400		Unknown.	5 25		Valentine.
16	Mauch Chunk.	250		Unknown.	22 20		Boyer.
19-20	Mauch Chunk.	500	150	Incendiary (?).	21 25		Boyer.
May 20	Mauch Chunk.	500	500	Incendiary (?).	7 63		Kemmerer.
	East Penn.	11	60	L. V.	1 13		Kemmerer.
3	East Penn.	4	53	Unknown.	44		Kemmerer.
3	East Penn.	1		L. V.	1 78		Kemmerer.
6	East Penn.	60	306	L. V.	8 25		Kemmerer.
6	East Penn.	12	72	L. V.	2 68		Kemmerer.
6	East Penn.	6	24	L. V.	9 00	1 20	Kemmerer.
11	East Penn.	15	90	L. V.	1 15	6 90	Esser.
13	Packer.	100	50	Boys (?).	1 62		Kemmerer.
12	East Penn.	6	36	L. V.	3 93	90	Kemmerer.
12	East Penn.			L. V.	8 20	30	Peters.
13	East Penn.	3	15	L. & N. E.	2 88	7 65	Neeb.
Aug. 8	Lower Towamensing.	5		Burning brush (*).			Snyder.
	Franklin.	50	10	Incendiary.	1 45		Strunk.
Sept. 2	Penn Forest.	2	25	Unknown.	5 10		Strunk.
Oct. 27	Packer.	50		Unknown.	11 86		Neeb.
Nov. 11	Packer.	75	200	Unknown.	8 61		Neumuller.
	Mauch Chunk.	50	63	Hunters.	1 59		Green.
11	Summit Hill.	50	50	Unknown.	2 38		Neumuller.
15	Lower Towamensing.	4	20	Hunters.	29 65	1 05	Neeb.
18	Summit Hill.	7	4,150	Unknown.	7 00		Kemmerer.
Dec. 6-8	Penn Forest.	3,000	60	L. V.	79 45		Neumuller.
	East Penn.	20	500	Unknown.	55 64	45	Hofmann.
7-8	Packer.	242	2,000	Unknown.			
7-8	East Side.	2,000	2,000	Unknown.			
		7,465.9	\$10,429		\$376 73	\$21 90	
CENTRE COUNTY.							
April 17	Boggs.	1		P. R. R.			Reese.
	Boggs.	1		P. R. R.			Reese.
17	Walker.						Harnish.
18	Walker.						
18	Walker.						
18	Rush.	125	125	Unknown.	\$10 33		Hess.
18	Rush.			False alarm.	8 76		Kelley.
19	Rush.	100	100	Fisherman.	2 62		McCord.
21	Rush.	20	50	Smoker (?).			McCarty.
20	Snow Shoe.	20	50				

May	1	Patton.	20	100	B. C. R.	7 06	9 60	Thompson.
1	1	Snow Shoe.	100	75	P. R. R.	7 01		Uzzell.
1-2	1	Curtin.	200	200	Mining engine.	32 82		Winkbleck.
2	2	Boggs.	400	600	Burning brush (l).	15 07		Reese.
3	3	Rush.	75	100	P. R. R.	2 66		Proutz-Hoover.
5	5	Snow Shoe-Burnside.	125	112	Unknown.	5 91	1 35	Uzzell.
8	8	Patton.	227	500	B. C.	60 52		Thompson.
9-16	9-16	Fatton-Ferguson.	1,400	1,000	Unknown (a).	292 44	642 50	Morton.
10-13	10-13	Haines.	55	30	Unknown.	65 37	73 20	Meek.
11	11	Snow Shoe.	300	225	P. R. R.	6 06	2 40	Sheeler.
11-12	11-12	Boggs.	200	150	P. R. R.	13 13		Reese.
11-13	11-13	Half Moon.	400	400	Unknown.	48 92		Harpster.
11-13	11-13	Half Moon-Ferguson.	700	207	Burning brush (b).	796 64	61 60	Wyse.
11-14	11-14	Haines-Miles.	3,550	3,000	Fishermen (c).	5 98		Silvis.
13	13	Rush.	60	90	Mining engine (d).	4 17		McCord.
12-13	12-13	Rush.	150	142	Mining engine (d).	9 06	4 50	McCarty.
12	12	Snow Shoe.	25	5	Mining engine (e).	2 31	2 00	Sheeler.
14	14	Snow Shoe.	18	164	Unknown.	6 85		Thompson.
16	16	Patton.	4	12	Burning brush.	10 90	3 25	Meek.
Sept. 1	1	Penn.	25	20	Mining engine (f).	15 15		McCord.
Oct. 7	7	Rush.	145	30	Smokers.	14 85	3 00	Proutz.
23	23	Rush.	10	40	Mining engine (g).	8 10	9 60	McCord-Hess.
26	26	Curtin.	50	12	Mining engine (h).	7 15	3 75	Sheeler.
27	27	College.	14	64	Unknown.	4 46	5 00	Keller.
28	28	Rush.	20	3	Mining engine (g).	7 25	6 60	Hess.
29	29	Rush.	20	2	Burning brush.	4 90	2 20	Winkbleck.
31	31	Curtin.	100	109	Mining engine (h).	7 25	4 80	Montgomery.
Nov. 3	3	Potter.	15	10	Hunters.	4 46	32 00	Hess.
9	9	Rush.	40	20	P. R. R. (?).	7 25		Hoover.
20	20	Huston.	3	20	Hunters.	3 10		Mattern.
23	23	Rush.	65	26	Smokers.	9 25	3 70	Hoover.
Dec. 6	6	Snow Shoe.	100	50	P. R. R.	50 05	9 00	Proutz.
7	7	Rush.	50	200	Smokers.	3 85		Sheeler.
7-8	7-8	Burnside.	75	37	Hunters.			Proutz.
8	8	Rush.	9,143.2	\$8,161	Mining engine (?).	\$1,556 20	\$891 15	

Note (*)—Person responsible excused on account of extreme poverty.

Note (†)—Person responsible excused on account of extreme poverty.

Note (a)—See also Huntingdon county. Two foresters, fire rangers, and six fire wardens fought this fire. Two hundred and fifty students from State College worked without pay.

Note (b)—Person responsible excused on account of extreme poverty.

Note (c)—Two foresters, three rangers, and wardens Hunt, Gramley, Brouse and Snyder.

Note (d)—Warden's bill of \$10.15 paid by company responsible.

Note (e)—No bill submitted as Coal Company paid warden voluntarily.

Note (f)—Warden's bill of \$3.32 paid by company responsible.

Note (g)—Bill for cost of extinction and damages presented to company. Not yet settled.

Note (h)—Fires extinguished by the company on their own land.

Note (i)—Person responsible excused on account of extreme poverty.

TABLE I—Continued.

Date.	Township.	Acres.	Damage.	Cause.	Cost of Extinction.		Warden.
					Fire Fund.	Other Sources.	
CHESTER COUNTY.							
April 16	South Coventry,	3	\$30	Unknown,	\$6 20	.....	Essick.
June 17	South Coventry,	45	645	Unknown,	13 95	.....	Essick.
Oct. 24	Valley,	4	.....	Unknown,	2 52	.....	Wirt.
Nov. 9	Valley,	2	.....	Boys,	15	.....	Wirt.
Nov. 11-12	South Coventry,	400	4,012	Hunters,	31 20	.....	Favinger-Woods.
		474	\$4,687		\$54 02	=====	
CLARION COUNTY.							
Nov. 4-5	Farmington,	4	\$26	Unknown,	\$5 80	.....	Lyons.
8-9	Limestone,	3	.....	Unknown,	7 55	.....	Spence.
		7	\$26		\$13 35	=====	
CLEARFIELD COUNTY.							
April 22	Morris,	6	.....	Railroad (?)	\$3 72	.....	Saroway.
May 1	Knox,	3	.....	N. Y. C.,	2 55	.....	Stott.
4	Morris,	10	.....	Boys,	12 43	.....	Saroway.
9-10	Huston,	20	\$245	Unknown,	11 35	.....	Kirk.
10	Penn.,	3	.....	Fisherman, .....	.....	.....	Sizer.
10-12	Beccaria,	70	.....	Burning brush (*),	18 00	.....	Spangle.
10-13	Woodward,	300	400	Drilling rig (+),	49 90	\$6 75	Moyer.
19	Huston,	15	15	Unknown,	9 45	2 00	Kirk.
21	Burnside,	25	250	N. Y. C.,	8 35	.....	Conner.
21	Goshen,	10	20	Unknown,	4 33	1 00	Leigey.
21-22	Goshen,	20	40	Unknown,	4 82	.....	Sankey.
Nov. 9	Decatur,	2	100	Hunters,	5 95	.....	Goss.
Dec. 7-8	Lawrence,	3,000	1	Hunters,	47 30	.....	Hornung.
8	Girard,	.5			.....	15	
		3,481.8	\$1,071		\$177 95	\$10 90	

CLINTON COUNTY.							
Jan. 29	Chapman,	3	.....	G. & P. R., .....	.....	\$1 00	Critchley.
Mar. 20	Grugan,	5	.....	P. R. R., .....	.....	4 80	Merrill.
April 5	Crawford,	50	\$25	Lumbering,	\$7 70	7 20	Metzger.
6	Chapman,	20	.....	P. R. R. (?), .....	.....	9 60	Ryon.
6-7	Colebrook,	150	150	P. R. R. (?), .....	.....	32 60	Ryon.
7	Colebrook,	12	240	Railroad (?),	4 15	4 50	Young.
7	Colebrook-Bald Eagle,	160	800	P. R. R., .....	.....	.....	Young.
10	Grugan,	1	2	P. R. R., .....	.....	40	Ryon.
12	Chapman,	1	.....	G. & P. R., .....	.....	40	Critchley.
13	Leidy,	15	75	Unknown,	2 83	95	Caldwell.
13	Colebrook,	2	30	P. R. R.,	10 30	2 40	Ryon.
18	Woodward,	70	75	Unknown, .....	.....	.....	Reeder.
18	Beech Creek,	100	75	Fisherman,	58 90	6 80	Winkebleck.
18-19	Woodward,	200	400	Unknown,	10 15	.....	Kellihan.
18-19	Noyes,	75	75	Unknown,	9 70	.....	Kepler.
30	Wayne,	50	250	Unknown,	3 08	.....	McKague.
May 1	Wayne,	3.5	10	P. R. R.,	1 20	.....	O'Donnell.
1-2	Leidy, .....	.....	.....	False alarm, .....	.....	.....	Wilson.
2	Chapman,	120	300	Unknown, .....	.....	35 00	Critchley.
2-3	Colebrook,	200	2,000	P. R. R.,	3 06	32 00	Young.
2-3	Beech Creek,	75	75	Unknown, .....	.....	15 00	Winkebleck.
6	Colebrook,	600	500	Incendiary, .....	.....	60 00	Winkebleck.
8-9	Leidy,	5	25	P. R. R.,	1 41	5 40	Wilson.
11	Wayne,	3	2	Lighting,	8 35	5 40	Young.
11-12	Wayne,	180	75	P. R. R.,	1 02	2 40	McKague.
11-14	Colebrook,	640	6,400	P. R. R.,	40 08	5 60	Hogentogler.
12	Pine Creek,	1,000	3,000	G. & P. R. (?),	11 02	152 00	Young.
12-13	Colebrook,	12	624	Spark from chimney of house,	78 90	.....	Critchley.
13-14	Beech Creek,	500	300	P. R. R.,	7 00	.....	McKinnay.
14-15	Wayne-Crawford,	240	100	Incendiary,	3 06	17 20	Young.
20	Wayne,	18	.....	Unknown,	70 44	6 60	Winkebleck.
Aug. 31	Chapman,	1	.....	G. & P. R.,	4 33	.....	Hogentogler.
5	Grugan,	1	.....	P. R. R., .....	.....	.....	McKague.
6	Logan,	5	.....	P. R. R., .....	.....	.....	Critchley.
22	Crawford,	2.5	10	Unknown, (a),	7 60	.....	Merrill.
22	Greene,	2	.....	Unknown,	42 40	.....	Hogentogler.
Sept. 3	Beech Creek,	1	5	Lighting (b),	7 45	6 00	Hogentogler.
4-9	Chapman,	25	25	Logging engine (c),	5 85	1 20	Hogentogler.
10	Woodward,	5	2	Mining engine (d), .....	.....	9 50	Dutlinger.
11	Woodward,	30	12	Mining engine (d), .....	.....	2 30	Vansickle.
12	Woodward,	80	16	Mining engine (d), .....	.....	7 56	Reeder.
12	Leidy,	75	25	Logging engine (c),	4 41	9 24	Reeder.
						.....	Wilson.

Note (*)—Person responsible excused on account of extreme poverty.

Note (†)—Settlement demanded of owner of land but not yet finally adjusted.

Note (a)—Burned in old bark peeling landing three feet deep.

Note (b)—Burned underground in swamp during very dry period.

Note (c)—Settlement demanded of owner. Not yet adjusted.

Note (d)—Company voluntarily paid warden's bills.

TABLE I—Continued.

Date.	Township.	Acres.	Damage.	Cause.	Cost of Extinction.		Warden.
					Fire Fund.	Other Sources.	
CLINTON COUNTY—Continued.							
Oct. 28	Ledy.	25	20	Hunters.	3 63	1 80	Muller.
Nov. 2-3	Wayne-Crawford.	150	150	Hunters.	40 20	7 00	Hogentogler.
Nov. 2-3	Gugan.	37	25	N. Y. G.	12 78	38 25	Blouse.
12	Ledy.	50	100	Unknown.	20 80	9 45	Muller.
20-22	Chapman.	100	100	Incendiary (*).	23 62	15 20	Critchley.
21	Gugan.	2	2	P. R. R.	23 62	5 60	Blouse.
23	Beech Creek.	150	50	N. Y. C.	23 62	7 00	Shoemaker.
Dec. 6-7	Ledy.	500	600	Burning house.	4 35	2 00	Muller.
7	Chapman.	85	25	Unknown.	16 20	6 00	Critchley.
7	Beech Creek.	200	20	Mining engine.	16 20	1 20	Winkbleck.
8	Chapman.	275	3,200	Hunters.	5529 40	5538 15	Critchley.
8-9	Gallagher.	6,700.8	23,330	Incendiary (†).	88 45		Neefe.
COLUMBIA COUNTY.							
May 9	Beaver.	25	500	Unknown.	27 75		Boone.
11-15	Jackson.	1,000	7,000	Unknown (a).	28 39		Brush.
21	Main-Catawissa.	2,000	10,000	Clearing (b).	11 10	2 65	Yeager.
Sept. 4	Pine.	3	100	Unknown.	3 08		Shoemaker.
8-9	Sugarloaf.	100	100	Mining engine (?).	15 70	1 50	Hess-Getz.
Oct. 27-28	Cunningham.	11		Mining engine (c).	15 70		Smith.
Nov. 6	Cunningham.	4	125	Camper's.	15 70		Smith.
12	Locust.	5					Craig.
CRAWFORD COUNTY.							
Aug. 30	Summit.	2		P. B. & L. E.	\$4 75		Shurrager.
Oct. 6	E. Fallowfield.	750		P. B. & L. E.	\$1 75		Langdon.
CUMBERLAND COUNTY.							
Mar. 30	Cooke.	1	\$1	P. & R.	\$1 22	\$1 54	Williams.
April 11	Cooke.	15	20	P. & R.		1 15	Williams.
15	South Middleton.	60	75	P. & R.		24	Powers.
16	South Middleton.	?		P. & R.		12	Powers.

April 17	South Middleton.	2	4	P. & R.	83	1 60	Williams.
24	Cooke.	3	6	P. & R.	1 59	5 38	Williams.
May 6	Dickinson.	937	1,500	P. & R. (†).	18 55	24 50	Williams.
10	Cooke.	4	3	P. & R.		27	Williams.
11	South Middleton.	3	250	P. & R.	16 15	8 38	Williams.
21	Dickinson.	5	10	P. & R.	4 50	97	Powers.
June 2	Dickinson.	5	10	Fire crackers.	6 55		Albright.
July 7	Silver Spring.	30	45	Hunters.	7 45		Mountz.
28-29	Frankford.	50	25	Unknown.	48 21		Stum.
Oct. 18	Frankford.	64	25	Hunter.	26 74	9 20	Wagoner.
Nov. 18-19	Hampden.	15	1	Hunters.	17 54		Wagoner.
18-19	East Pennsboro.	18	1	Hunters.	1 66	90	Wagoner.
20	Hampden.	?	75	Unknown.	24 50		Mountz.
21	Frankford.	150		Unknown.	4 28		Stum-Lightner.
2-3	Lower Millin.	3		Boy.			Rupp.
Dec. 7	Hopewell.	1,517	\$2,019			\$74 85	
DAUPHIN COUNTY.							
April 7-8	Wilsonco.	400	\$200	P. & R.	\$40 00		Williams.
11	Wayne.	220		Lumbering (‡).	20 30		Romberger.
11	West Hanover.	350	3,000	Unknown.	31 24		Mumma.
18	Middle Paxton.	100		P. & R.	1 65		Hampton.
18	Upper Paxton-Halfax.	155	306	P. & R.	17 00	\$21 00	Mills.
19-20	Williams.	125	125	P. & R.	25 75		Williams.
20	Upper Paxton.	66	112	P. & R.	6 10	28 00	Mills.
23	Williams.	60	100	Unknown.	9 65		Knorr.
May 6	Washington.	74.5		P. & R. R. (?).	3 72	30 00	Lentz.
11	Upper Paxton.	13	30	P. & R. R.	1 75	12 80	Mills.
12	Williams.	4	100	P. & R.	9 48		Williams.
12-13	Williams.	150	100	Unknown.	23 04		Williams.
13-14	Middle Paxton.	120	65	Unknown.	22 55		Lebo.
Oct. 17	Halfax.	3	240	Hunters.	45		Matter.
17-18	Williams.	200	500	P. & R.	25 70		Williams.
26	Washington.	6	12	P. & R.	1 25		Lubold.
Nov. 1-2	Lower Paxton.	200	1,000	Hunters.	39 90		Hassler.
2-4	Middle Paxton.	400	7	P. & R. (?).	21 00		Lebo.
18-19	East Hanover.	7		Hunters.	2 60		Hampton.
		3,603.5	\$8,466		\$307 94	\$91 80	

Note (†)—Highway foreman set fire to leaves in gutters and left them. Referred to Highway Dept.
 Note (‡)—Incendiary now in Lycoming county jail awaiting trial.
 Note (a)—See also fires of same dates in Jordan township, Lycoming county, and Davidson, Sullivan.
 Note (b)—Bill outlawed because not presented within sixty day limit. Settlement demanded.
 Note (c)—Settlement demanded of company responsible. Not yet adjusted.
 Note (1)—Bill for damages and costs of extinction presented to railroad but not yet settled.
 Note (2)—Claim presented to company. Not yet settled.

TABLE I—Continued.

Date.	Township.	Acres.	Damage.	Cause.	Cost of Extinction.		Warden.
					Fire Fund.	Other Sources.	
BLK COUNTY.							
April 18	Jay,	6	\$2	P. R. R.,		\$3 00	McLeod.
May 1	Jay,	8	3	P. R. R.,		2 70	McLeod.
May 11-16	Benzinger,	500		Lumbering (1),	\$18 42		Pearley.
May 24-25	Fox,	30		P. S. & W.,	22 00		Smithbauer.
Aug. 2-12	Benezette,	700	2	P. R. R.,		1 00	Zerby.
Oct. 7	Highland,	1.5	2,650	Bee hunters,	490 34		Amey-Blaisdell.
Oct. 12	Highland,	5	5	Burning brush (2),	8 85	2 40	Blaisdell.
Oct. 20	Benezette,	2	2	Bee hunters (3),	4 20	7 60	Zerby.
Oct. 29	Benezette,	2	1	Smokers,	24 25	2 70	Zerby.
Nov. 2-3	Highland,	25	25	Hunters,	3 35	1 65	Amey.
Nov. 8-9	Benezette,	4	2	Hunters,			Markert.
Dec. 11	Benezette,	100	100	P. R. R.,	9 25	5 20	Zerby.
Dec. 7	Benezette,	1,379.6	\$2,792	Hunters,	\$581 56	\$29 75	
FAYETTE COUNTY.							
April 20	North Union,	35	\$400	Burning brush (a),	\$24 62	\$2 25	Beatty.
May 20	North Union,	125	400	Burning brush,	9 85		Shanabarger.
May 30	South Union,	300	500	Incendiary,			Beatty.
May 30	Stewart,	20	200	B. & O.,	12 52	1 50	Jackson.
May 31	Bullskin,	20	100	Burning brush (b),	8 75	5 25	Myers.
May 31	Bullskin,	600	650	Burning brush (c),	21 05		Humberston.
May 31	Henry Clay,	104	624	Unknown,	19 85		Myers.
May 31	Bullskin,	14	2,015	Boys,	12 80		Beatty.
May 31	North Union,	90	175	Logging engine (d),	13 00		Gilsan.
May 31	Henry Clay,	100	350	I. C. R. R. (e),	17 35	8 00	White.
May 31	Springfield,	200		Hunters,	8 20		Wingrove.
May 31	Bullskin,	60	100	Unknown,	22 05		Jaynes.
May 31	South Connellsville,	80		Unknown,	3 65		Beatty.
May 31	Stewart,	300	664	Incendiary,	22 02	90	West.
May 31	Wharton-Georges,	200		Hunters,	13 52		Beatty.
May 31	Dunbar,	750		Unknown,	44 83		West.
May 31	Wharton,	30		Incendiary,	2 46	90	Beatty.
May 31	North Union,	6		Incendiary,	2 35		Wingrove.
May 31	Bullskin,						
FOREST COUNTY.							
Aug. 20-31	Jenks,	60		B. & O.,	\$3 25		Eldridge.
Sept. 20	Howe,			B. & O.,	6 00		Booth.
Oct. 5	Jenks,	240		B. & O.,	10 15	\$0 30	Eldridge.
Oct. 7	Jenks,	2		B. & O.,		45	Eldridge.
Oct. 7	Jenks,	10		B. & O.,		6 00	Eldridge.
Oct. 7	Brookston,	25		Unknown,		1 20	Booth.
Oct. 27	Jenks,	2	\$25	B. & O.,	3 59		Eldridge.
Oct. 29-30	Brookston-Howe,	337	\$25	Children,	\$23 30	\$7 95	Booth.
FRANKLIN COUNTY.							
Mar. 18	Quincy,	1	\$1	Incendiary,	\$0 15	\$0 15	Staley.
Mar. 27	Quincy,	15	30	Incendiary,	1 75	45	Staley.
Mar. 31	Guilford,	7		C. V.,		18	Staley.
Mar. 31	Guilford,	7		C. V.,		35	Staley.
Mar. 31	Guilford,	7		C. V.,		18	Staley.
Mar. 31	Quincy,	1	1	C. V.,		18	Staley.
Mar. 31	Green,	7.5	15	Incendiary,	24	1 92	Conklin.
Mar. 31	Green,	15	15	False alarm,	1 61	27	Conklin.
Mar. 31	Green,	20	10	Incendiary,	91	6 18	Conklin.
Mar. 31	Green,	5.5	16	False alarm,	8 81	16 44	Conklin-Eckensrode.
Mar. 31	Quincy,	2	15	Unknown,	94	36	Staley.
Mar. 31	Quincy,	15	15	Incendiary,	2 33		Staley.
Mar. 31	Metcal,	2	2	Children,	5 73	6 26	Conklin.
Mar. 31	Green,	2	2	Steam roller,			Rupp.
Mar. 31	Peters,	2	2	C. V.,		1 87	Staley.
Mar. 31	Guilford,	3.5	10	C. V.,	87	2 05	Staley.
Mar. 31	Guilford,	7	21	Incendiary,	2 17	45	Staley.
Mar. 31	Quincy,	75	150	Incendiary,	19 67		Staley.
Mar. 31	Peters-Warren,	1.5	4	Unknown,	15		Staley.
Mar. 31	Quincy,	20	40	Incendiary,	1 40	8 23	Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
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Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
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Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20		Incendiary,			Staley.
Mar. 31	Quincy,	20					

Note (1)—See fire of same date in Cameron county.
 Note (2)—Warden's bill paid by person responsible.
 Note (3)—Warden's bill voluntarily paid by persons responsible.
 Note (a)—Attorney General refused to act. Settlement demanded of person responsible.
 Note (b)—Warden's bill of \$8.75 paid by person responsible.
 Note (c)—Attorney General recommends prosecution. Case pending.
 Note (d)—Settlement demanded of company responsible. Not yet adjusted.
 Note (e)—Settlement demanded of railroad company. Not yet adjusted.

TABLE I—Continued.

Date.	Township.	Acres.	Damage.	Cause.	Cost of Extinction.		Warden.	
					Fire Fund.	Other Sources.		
FRANKLIN COUNTY—Continued.								
May	Green.	5	10	Unknown.	2 59	6 34	Conklin.	
	Guilford.	3	6	Incendiary.	30	8 70	Staley.	
	Quincy.	1	2	Incendiary.	08	18	Staley.	
	Quincy.	1	2	Incendiary.	.....	18	Staley.	
	Guilford.	1	.....	Incendiary.	.....	4 96	Staley.	
	Washington.	15	30	Incendiary.	2 70	90	Staley.	
	Letterkenny.	?	.....	Unknown.	1 85	.....	Newton.	
	Quincy.	5	15	Incendiary.	75	.....	Staley.	
	Guilford.	4	8	C. V. (?)	15	9 88	Staley.	
	Quincy.	3	9	Incendiary.	4 07	7 74	Staley.	
	Quincy.	2	6	Incendiary.	75	18	Staley.	
	Quincy.	50	200	Incendiary.	4 67	1 08	Staley.	
	Quincy.	14	28	Incendiary.	1 50	90	Staley.	
	Quincy.	15	15	Incendiary.	15	18	Staley.	
	Quincy.	3	3	Incendiary.	.....	8 46	Staley.	
	Quincy.	2	4	Incendiary.	60	4 53	Staley.	
	Quincy.	2	12	Unknown.	.....	8 73	Rupp.	
	Letterkenny.	3	350	Incendiary.	.....	125 53	Staley.	
	Guilford.	2	4	Incendiary.	.....	90	Staley.	
	Quincy.	5	10	Incendiary.	.....	1 50	Staley.	
	Quincy.	?	.....	Children.	.....	1 56	Kline.	
	Peters.	2	3	Incendiary.		30	36	Staley.
	Quincy.	4	6	Incendiary.		3 33	10 01	Staley.
	Guilford.	2	4	Incendiary.		30	36	Staley.
	Quincy.	6	9	Incendiary.		2 56	2 72	Staley.
	Quincy.	100	200	Incendiary.		35 15	60 18	Staley.
Washington.	5	10	Campers.	.....	2 42	18	Staley.	
Quincy.	3	3	Incendiary.	.....	40	18	Staley.	
Letterkenny.	?	.....	Fisherman.	.....	.....	.....	Rupp.	
Metal.	1	.....	Hunters.	.....	2 31	.....	Horning.	
Peters.	20	20	Dinkey (*).	.....	.....	38 54	Rupp.	
Letterkenny.	50	50	Hunters.	.....	111 68	5 20	Newton.	
Peters.	?	.....	Smoker.	.....	.....	.....	Rupp.	
Letterkenny-Metal.	50	50	Unknown.	.....	13 22	.....	Horning-Horne-Wrights.	
Lurgan.	2	5	Incendiary.	.....	2 92	.....	Sentman.	
Quincy.	1	15	Incendiary.	.....	71	35	Staley.	
Quincy.	15	45	Incendiary.	.....	3 90	16 14	Staley.	
Oct.								
Nov.								

12	Quincy.	1	1	Incendiary (*).		3 42	Staley.
19	Peters.	30	75	Incendiary.		2 40	Rupp.
20	Quincy.	10	20	Former fire.		2 40	Staley.
21	Quincy.	75	150	Hunter.		12 60	Staley.
22	Peters.	60		Unknown.			Rupp.
27	Fannett.	100		Unknown.			Lytle.
27-28	Fannett.	20		Incendiary.		3 68	Rupp.
28	Letterkenny.	6		Incendiary.		7 36	Staley.
28	Quincy.	11.5	34	Incendiary.		6 16	Staley.
28	Quincy.	2	16	Incendiary.			Pegan.
28	Quincy.	2		Unknown.		81	Staley.
3	Fannett.	100		Hunters.		49 15	Foreman-Sidel.
4	Quincy.	5	305	Unknown.		19 51	Horne.
5	St. Thomas.	150	110	Unknown.		6 85	Staley.
6	St. Thomas.	20	15	Unknown.		4 37	Staley.
6	Guilford.	2.5	15	Unknown.		10 36	Conklin.
6	Green.	3		Unknown.			
7		?					
		1,525.7	\$2,219		\$511 90	\$385 96	
FULTON COUNTY.							
April 18	Bethel.			Traction engine (a).		\$1 20	Bishop.
18	Apr.	12	30	Sawmill (b).		25 76	Rupp.
23	Apr.	2.5		Unknown.		6 83	Hart.
29	Brush Creek.	150	300	Incendiary (c).		15 46	Jackson.
May 9	Todd.	?		Lightning.		2 16	Kerlin.
12-14	Taylor-Well.	200	158	Burning brush (d).		38 50	Keith-Stevens.
2	Brush Creek.	45		Incendiary.		4 98	Jackson.
2-4	Dublin.	350	1,400	Hunters.		103 32	Fraker-Free-Shore.
3	Thompson.	1		Unknown.		2 38	Hann.
10	Dublin.	20	45	Hunter.		19 18	Rupp.
10	Licking Creek.	1		Unknown.		95	Hann.
10	Brush Creek.	5		Hunters.		2 73	Jackson.
10	Licking Creek.	10		Unknown.		3 03	Hann.
12	Licking Creek.	15	45	Hunters (?).		27 44	Carnell.
17	Bethel.	10	6	Incendiary.		11 10	Rupp.
18	Apr.	350	350	Unknown.		18 74	Hann-Jackson.
20	Brush-Licking Creek.	20	8	Unknown.		2 43	Hann.
21	Licking Creek.	2		Unknown.		6 73	Deaver-King.
Dec. 6	Taylor.	1,199.5	\$2,362		\$276 05	\$36 71	

Note (*)—Warden's bill paid by the company responsible.

Note (†)—Set by Herman McFerrer, deaf mute. Warrant for his arrest has been issued but constable has been unable to find him to date.

Note (a)—Attorney General refused case. Settlement demanded of owner. Not yet adjusted.

Note (b)—Owner voluntarily paid warden and men engaged in extinguishing this fire.

Note (c)—Case referred to Attorney General. Investigation ordered.

Note (d)—Settlement demanded of person responsible. Not yet adjusted.

TABLE I—Continued.

Date.	Township.	Acres.	Damage.	Cause.	Cost of Extinction.		Warden.	
					Fire Fund.	Other Sources.		
HUNTINGDON COUNTY.								
April	Todd-Lincoln,	2,100	\$2,000	J. & S. (a),	\$97 77	\$25 80	Black.	
	Clay,	2	10	E. B. T. (?),	17 05	1 80	Rupert.	
	Brady,	25	50	Tramp,	4 55	28 50	Bodine.	
	Morris,	75	25	Mining engine (b),	4 15	4 55	Morton.	
	Carbon,	50	540	Boys,	70 20	4 50	Donelson.	
	30-1	Cromwell,	100	100	Unknown,	14 80	9 00	Myers.
	1-2	Union,	100	100	Mining engine (c),	17 74	17 74	Parker.
	6	Penn.,	20	6,009	Unknown,	557 24	75 00	Black.
	9-13	Jackson,	40	60	Unknown (d),	7 32	12 75	Norris.
	10	Warriors Mark,	80	200	Sawmill,	32 61	4 95	Morton.
Nov.	11-12	Tell,	5	40	J. & S. (f),	3 42	1 80	Harpster.
	12-13	Todd,	10	10	Unknown,	1 77	45	Saylor.
	2	Logan,	4	1	Burning leaves (g),	2 05	80 00	Morton.
	2	Warriors Mark,	50	12	Unknown,	1 93	7 20	Geist.
	2	Warriors Mark,	10	10	P. R. R.,	2 05	51 50	Hammond.
	2	Onelda,	200	500	Unknown,	4 90	4 90	Morton.
	2-3	Springfield,	30	60	Hunters,	4 75	3 20	Greene.
	4	Wood,	6	15	Incendiary,	8 71	3 20	Kelth.
	7-8	Walker,	20	15	Hunters,	8 76	5 20	Robb.
	9	Porter,	1	5	Unknown,	3 85	7 52	Green.
Dec.	11-12	Todd,	15	15	J. & S. (f),	13 84	5 10	Perry.
	13	Tell,	3	5	Hunters,	11 35	32 30	Burdge.
	17-18	Tell,	1	1	Hunters,	27 15	32 30	Wiser.
	18-20	Todd,	3	5	J. & S.,	3 70	1 20	Perry.
	21	Henderson,	6	10	Unknown,	3 85	7 52	Herrick.
	26	Henderson,	25	75	Unknown,	13 84	7 52	Herrick.
	28-29	Dublin,	20	20	Hunters,	11 35	32 30	Peterson.
	2	Shirley,	1	2	Hunters,	11 35	32 30	Bodine.
	7	Logan,	1	2	Hunters,	11 35	32 30	Morton.
	8	West,	9	250	Hunters,	11 35	32 30	Morton.
8-9	Dublin,	7,610.5	\$10,118	Unknown,	27 15	32 30	Diven.	
					\$963 41	\$215 57		

INDIANA COUNTY.

May 14-15	East Wheatfield,	390	\$3,200	Hot ashes (h),	\$33 90	\$10 90	Weller.
Oct. 30	West Wheatfield,	40	50	W. P. (?),	4 45	4 45	Gamble.
Nov. 9	Brush Valley,	20	150	Hunters,	9 10	9 10	Grow.
9-10	East Wheatfield,	5		Railroad (?),	2 50	2 50	Troska.
Dec. 7	Rayne,	2		B. R. & P.,	1 75	1 75	Buchanan.
		457	\$3,400		\$31 70	\$10 90	
Oct. 18	Reaver,	6		Hunters,	\$3 18	\$0 75	Booser.
Nov. 7	Warsaw,	10		Unknown,	3 70	\$0 75	Rhodes.
		16			\$6 88		
Mar. 31	Milford,	10	\$10	Lumbering (1),	\$2 80		McCahan.
31	Milford,	75	75	Lumbering (1),	2 50		Wetzler.
April 19-20	Beale-Milford,	1,200	220	Burning brush (2),		\$60 72	McCahan-McKeen.
30	Lack-Tuscarora,	1,675	3,350	Incendiary (3),	29 86	6 90	Bodine.
May 6-7	Fermanagh,	300	1,145	Unknown (4),	57 05	3 30	Shellenberger.
12-13	Susquehanna,	50	10	Sawmill (4),	23 07	1 50	Klinger.
15	Milford,	10	10	Railroad (?),	1 60	17 25	Baltozer.
Sept. 6	Lack,	250	500	Logging (5),	45 93		Hammann.
Oct. 11-13	Fayette,	1	1	Hunters,	2 95		Shellenberger.
26	Fermanagh,	1	10	Children (6),	4 00	3 30	McMeen.
Nov. 2	Tuscarora,	3	15	Hunters,	12 10	45	Allen.
3	Tuscarora,	100	45	Hunters,	19 45		Lauthers.
11-12	Tuscarora,	5.4	10	Hunters,	3 40		Lauthers.
20	Lack,	3	20	Smoker,	2 05		McCahan.
Dec. 6	Milford,	10	20	Unknown,			
		3,692.6	\$6,061		\$206 76	\$92 52	

JUNIATA COUNTY.

Note (a)—Also fought by wardens Criswell, Scott and Norris.
 Note (b)—Company paid warden's bill and \$25 damage for State land burned over.
 Note (c)—Attorney General refused case. Company paid warden's bill.
 Note (d)—See also fire of same date in Centre Co.
 Note (e)—Settlement demanded of owner of mill.
 Note (f)—Referred to Attorney General. No action taken.
 Note (g)—State Highway foreman burning leaves along right of way on very windy day. Referred to Highway Department for action.
 Note (h)—Fire destroyed several buildings. Settlement demanded from company responsible.
 Note (i)—Company responsible paid cost of extinction and promised to improve conditions.
 Note (j)—Warden's bill of \$55.32 paid by person responsible.
 Note (k)—See also fire of same date in Milfill Co.
 Note (l)—Settlement demanded of owners.
 Note (m)—Under investigation. See also fire of same date in Snyder Co.
 Note (n)—Teacher asked to caution children and distribute forest fire literature.

TABLE I—Continued.

Date.	Township.	Acres.	Damage.	Cause.	Cost of Extinction.		Warden.
					Fire Fund.	Other Sources.	
LACKAWANNA COUNTY.							
April 20	Ransom,	110	\$300	Unknown,	\$8 25	.....	Beagle.
28-29	Spring Brook,	50	200	E. R. R.,	9 55	.....	Haines.
30	Spring Brook,	500	500	Burning brush,	25 20	13 90	Kaufman.
May 1	Spring Brook,	500	250	Burning brush,	20 08	6 00	Kaufman.
1-3	Old Forge,	40	60	Unknown,	3 45	.....	Beagle.
9-10	Clifton,	100	500	Unknown,	31 50	.....	Smith.
24	Clifton,	90	500	Unknown,	24 25	.....	Smith.
27	Ransom,	85	200	Smoker,	10 33	.....	Beagle.
Aug. 22-24	Ransom,	180	200	Unknown,	8 52	.....	Beagle.
Oct. 26	Benton,	75	100	Unknown,	20 50	.....	Wiedman.
Dec. 6-9	Roaring Brook,	600	200	Unknown,	5 65	.....	Moore.
	Lehigh,	800	400	Hunters,	66 40	6 38	Kaufman.
		3,050	\$3,410		\$233 68	\$26 28	
LANCASTER COUNTY.							
April 18	Caernarvon-Salisbury,	300	\$2,025	P. R. R. (?),	\$41 38	.....	Geist.
20	East Earl,	50	500	Railroad (?),	22 43	.....	Geist.
		350	\$2,525		\$63 81	.....	
LEBANON COUNTY.							
April 18-19	South Lebanon,	100	.....	Unknown,	\$14 75	.....	Horst.
18-19	Cornwall-S. Lebanon,	1,000	\$1,200	C. & L. (?),	40 60	.....	Nelson.
		1,000	\$1,200		\$55 35	.....	
LEHIGH COUNTY.							
April 19	Lynn,	15	\$100	Unknown (1),	\$5 58	\$1 80	Robert.
May 1	Salisbury,	40	250	Unknown,	9 35	.....	Ludwig.
1	Upper Saucon,	30	300	Burning brush (2),	4 02	.....	Mory.
6	Lynn,	105	300	Unknown,	5 35	.....	Robert.
12	Lynn,	75	200	Unknown,	22 27	6 45	Robert.
21	Upper Saucon,	25	110	Unknown,	5 39	.....	Mory.
Oct. 25	Salisbury,	3	.....	Unknown,	2 95	.....	Ludwig.
Dec. 7	Lynn,	150	300	Clearing (3),	20 60	16 50	Hefntrayer.
		443	\$1,560		\$75 41	\$24 75	

LUZERNE COUNTY.

April 6	Dennison,	3	\$3	L. V.,	\$1 85	.....	Amend.
12	Laurel Run,	12	25	Unknown,	8 75	.....	Bower.
18	Conyngham,	175	200	Sawmill (a),	32 30	.....	Bloss.
18	Dorrence,	100	.....	Unknown,	3 43	.....	Eckrote.
18	Laurel Run,	15	100	Unknown,	15 45	.....	Bower.
13	Laurel Run,	50	1	Unknown,	23 05	.....	Bower.
19	Laurel Run,	100	1 25	Unknown,	37 45	.....	Amend.
May 1	Dennison,	2	200	C. R. R. of N. J. (?),	73	.....	Bond.
1	Bear Creek,	150	.....	L. V.,	46 40	.....	Bower.
1	Laurel Run,	60	350	Unknown,	23 05	.....	Williams.
2-3	Wright-Fairview,	120	258	Unknown,	28 50	.....	Bond.
6	Bear Creek,	100	.....	Children (b),	24 52	.....	Amend.
10	Dennison,	10	800	Unknown,	8 90	\$3 00	Blaine.
10	Fairmount,	60	320	C. R. R. of N. J.,	2 60	.....	Amend.
10	Dennison,	30	200	C. R. R. of N. J.,	1 40	.....	Amend.
11	Dennison,	600	6,000	Unknown,	53 90	.....	Eckrote.
11	Butter,	1,200	3,000	L. V. (c),	116 75	15 70	Blaine.
11-12	Ross,	10,000	.....	Unknown,	18 73	.....	Dutter.
11-12	Fairview,	100	.....	Railroad (d),	.....	.....	Williams.
11-14	Buck,	100	250	Incendiary,	.....	.....	Bond.
13-14	Wright,	20	.....	L. V.,	12 05	.....	Warman.
14	Bear Creek,	25	20	Unknown,	4 75	.....	Wiener.
20	Bear Creek,	25	50	Hunters,	6 48	.....	Frost.
21	Plymouth,	25	.....	Musroom pickers (?),	4 02	.....	Wiener.
Sept. 9	Black Creek,	15	.....	Unknown,	3 35	.....	Bower.
14	Duryea Borough,	4	40	Road workers (?),	1 31	.....	Amend.
14	Duryea Borough,	7	.....	Unknown,	2 83	.....	Amend.
19	Hazle,	12	.....	Smokers,	25 25	.....	Bower.
22	Laurel Run,	4	125	C. R. R. of N. J.,	11 05	1 50	Williams.
Oct. 2	Duryea Borough,	8	60	Hunters,	7 40	.....	Wiener.
12	Dennison,	36	.....	C. R. R. of N. J. (?),	2 85	.....	Frost.
17	Laurel Run,	15	.....	False alarm,	4 75	.....	Warman.
18-19	Wright-Fairview,	4	.....	Smokers,	8 25	.....	Blaine.
21-22	Hazle,	4	.....	Unknown,	1 92	.....	Amend.
25	Duryea,	4	.....	C. R. R. of N. J.,	5 95	1 50	Williams.
28	Plymouth,	40	180	L. V. (?),	2 50	.....	Larish.
Nov. 2	Fairmount,	200	.....	Unknown,	4 00	.....	Linskill.
3	Dennison,	20	.....	Hunters,	1 08	.....	Frost.
9	Fairview,	15	25	Smokers,	10 25	.....	Bower.
8	West Wyoming,	.....	.....	Unknown,	.....	.....	.....
9-10	Kingston,	.....	.....	.....	.....	.....	.....
12	Duryea,	.....	.....	.....	.....	.....	.....
30	Laurel Run,	.....	.....	.....	.....	.....	.....

Note (1)—Referred to Attorney General. Investigation authorized.
 Note (2)—Warden's bill paid by person responsible.
 Note (3)—Settlement demanded of person responsible. Not yet adjusted.
 Note (a)—Settlement demanded of person responsible. Not yet adjusted.
 Note (b)—Settlement demanded of parents but not yet adjusted.
 Note (c)—Referred to Attorney General. Suit pending.
 Note (d)—Bill outlawed because not presented within sixty day limit.

TABLE I—Continued.

Date.	Township.	Acres.	Damage.	Cause.	Fire Fund.	Other Sources.	Warren.
LUZERNE COUNTY—Continued.							
Dec. 5-6	Plymouth,	140	350	Unknown,	33 63	.....	Warman.
6	Laurel Run,	10	30	Unknown,	10 65	.....	Bower.
6-8	Bear Creek-Bucks,	1,200	2,000	Hunters,	113 10	.....	Bond.
7	Laurel Run,	35	100	C. R. R. of N. J.,	23 25	.....	Bower.
7	Fairview-Wright,	50	100	Unknown,	8 60	6 00	Williams.
7-8	Wilkes-Barre-Hanover,	70	130	Railroad,	10 02	.....	Warman.
		15,859	\$15,172		\$1,020 67	\$32 90	
LYCOMING COUNTY.							
April 7	Lewis,	5	\$2	P. R. R. (?),	\$15 70	\$1 40	Wells.
May 9	Franklin,	12	50	Incendiary (a),	6 55	61 83	Lunger.
10-12	Cummings,	200	500	N. Y. C. (b),	16 60	3 00	Evans.
11	Franklin,	40	50	Unknown,	2 35	.....	Lunger.
12	Lewis,	5	50	S. & N. Y.,	113 15	7 15	Wells.
12	Gamble,	400	50	Sawmill (c),	5 11	.....	Eddy.
12-13	Joran,	3	.....	Unknown (d),	12 65	1 70	Bastian.
13-14	Upper Fairfield,	14	.....	Burning brush (e),	3 35	6 25	Reed.
Aug. 24-25	McIntyre,	20	1	Lightning,	13 75	.....	Emick.
Sept. 11-12	Cascade,	1	.....	Unknown,	4 45	20	Wells.
Oct. 11	Lewis,	1	25	P. R. R. (?),	5 10	1 80	Moyer.
12	Cascade,	2	10	Unknown,	5 95	2 40	Neefe.
30	McHenry,	100	100	Hunters,	18 60	.....	Decker.
Nov. 5	Armstrong,	50	50	Unknown,	77 87	4 40	Neefe.
13-14	Pine,	1,920	30	Hunters,	5 40	9 90	Haer.
19-20	Washington,	4	.....	Unknown,	15 20	3 48	Neefe.
Dec. 6-7	Watson,	1	5	Railroad (?),	\$0 45	.....	Neefe.
6-7	Watson,	15	5	Incendiary (f),	95	.....	Neefe.
7	Watson,	1	.....	Incendiary (f),	74 98	10 00	Neefe.
Dec. 8	McHenry,	1	.....	Incendiary (f),	1 80	1 20	Neefe.
8	Cummings,	600	2,000	Incendiary (f),	13 60	1 60	Neefe.
8-9	Cummings,	150	600	Incendiary (f),	25 15	14 20	Neefe.
8-9	McHenry,	255	1,000	Incendiary (f),			
8-9	Cummings-McHenry,	1,200	6,000	Incendiary (f),			
8-9	McHenry,	5,008.9	\$10,520		\$439 16	\$130 86	

McKEAN COUNTY.							
May 11	Keating,	12	\$25	Burn'g brush, (1),	\$15 73	\$5 70	Emerick.
11-14	Hamilton,	150	225	Burn'g brush (2),	25 48	7 28	Thunberg.
11-15	Norwich,	400	15	Lumbering (3),	6 38	.....	Evans.
Oct. 20	Hamlin,	18	16	Unknown,	1 28	1 80	Cummings.
Nov. 22	Smithport,	35	25	Unknown,	9 54	.....	Cummings.
Dec. 9	Keating,	625	\$406	Unknown,	\$58 41	\$14 78	
MERCER COUNTY.							
Nov. 3	Worth,	6	.....	Unknown, .....	.....	\$8 50	Buckley.
MIFFLIN COUNTY.							
April 18-19	Granville,	100	\$100	Stave mill (3),	\$43 15	\$2 25	Shahen.
20	Bratton,	200	200	Incendiary,	13 65	.....	Kaufman.
20	Armagh,	1	1	P. R. R.,	172 56	3 75	Meek.
30	Bratton,	1,875	3,750	Incendiary (4),	14 83	21 00	Rodine.
May 6	Armagh,	1	20	P. R. R.,	2 78	38 25	Meek.
6	Armagh,	2	6	P. R. R.,	9 45	7 50	Hironimus.
9	Armagh,	1	1	False alarm,	16 55	25 83	Warfield.
12	Brown,	40	40	Unknown, .....	.....	20	Rhoades.
13	Granville,	1	1	Burn'g auto,	17 43	1 55	Warfield.
Sept. 10	Union,	1	35	Hunters,	11 57	3 10	Bliesch.
13	Union,	32.5	2	Incendiary,	68	2 50	Yoder.
Oct. 30	Manno,	4	4	P. R. R.,	38	2 80	Meek.
Nov. 18	Armagh,	1	2	Hunters,	2 88	5 20	Meek.
18	Armagh,	150	75	Hunters,	17 85	.....	Warfield.
22	Armagh,	45	57	Unknown,	32 95	1 20	Kemperling.
Dec. 5-6	Wayne,	2,471.5	\$4,294	Unknown,	\$356 61	\$118 88	Schriest.

Note (a)—Referred to Attorney General who advised not to prosecute. Claim presented.

Note (b)—Case refused by Attorney General.

Note (c)—Warden's bill of \$4.15 paid by persons responsible.

Note (d)—See also fire of same date, Columbia and Sullivan counties.

Note (e)—Settlement demanded of person responsible but not yet finally adjusted.

Note (f)—Frank Holden, Lucullus, Pa., set twenty-five fires. Some of these burned together and are reported as one fire. Holden confessed and is now in Lycoming county jail.

Note (1)—Settled Oct. 3, 1916, by payment of costs of suit and damages amounting to \$46.50.

Note (2)—Settlement demanded of person responsible but not yet adjusted.

Note (3)—No evidence. Owner does not believe his mill responsible but has made everything right with persons damaged and promises care in future.

Note (4)—See also fire of same date in Juniata county.

TABLE I—Continued.

Date.	Township.	Acres.	Damage.	Cause.	Cost of Extinction.		Warden.
					Fire Fund.	Other Sources.	
MONROE COUNTY.							
April 3	Paradise.	18	\$10	Unknown.	\$3 20	\$1 80	Shaller.
6	Barrett.	3	3	D. L. & W.		45	Whittaker.
11	Paradise.	5	2	D. L. & W.	3 80		Learn.
12	Pocoyo.	10		D. L. & W.		1 20	Whittaker.
15	Barrett.	4	10	D. L. & W.		2 70	Whittaker.
16	Barrett.	15	15	D. L. & W.	5 75	2 55	Chingston.
19	Jackson.	10	60	E. R. & W.	83	2 80	Whittaker.
21	Barrett.	30	30	D. L. & W.		30	Shaller.
29	Coolbaugh.	5	175	D. L. & W.	5 54		Haase.
May 1	Price.	150	15	Unknown.	60	50	Herman.
3	Chestnut Hill.	25		False alarm.	3 45		Herman.
3				D. L. & W.	15 69	1 60	Shaller.
6	Coolbaugh.	15		W. & E.		15	De Haven.
9	Pocoyo.	2	25	Sawmill (*).	17 05	2 40	Brewer.
9	Hamilton.	100	150	D. L. & W.	27 39	1 40	Shaller.
11	Coolbaugh.	60	250	Unknown.	41 30	3 60	De Haven.
11	Pocoyo.	125	375	Unknown.	5 63	2 00	Herman.
13	Tunkhamock.	300		For berries.	4 42	5 70	Herman.
16	Tunkhamock.	50		For berries.	68		Shaller.
20	Coolbaugh.	5	1	D. L. & W.		90	De Haven.
22	Tunkhamock.	1	75	D. V.	7 75	1 20	Mosier.
22	Middle Smithfield.	20	2	Unknown.	1 60		Shaller.
Aug. 10	Coolbaugh.	5		Unknown.		30	Shaller.
Sept. 12	Coolbaugh.	2	?	D. L. & W.		1 20	Whittaker.
Oct. 4	Barrett.	2	3	Hunters.		48	Whittaker.
15	Barrett.	7	1	Hunters.	1 02		Snyder.
23	Polk.	?		Unknown.		50	Lash.
26	Smithfield.	2	2	Hunters.		90	De Haven.
26	Tunkhamock.	2	25	Burning rubbish.		13	Lash.
30	Smithfield.	1		Hunters.		90	Brewer.
31	Stroud.	1.5	5	Hunters.	1 80		Brewer.
Nov. 3	Hamilton.	2	3	Unknown.	3 25		Shaller.
4	Paradise.	1	1	Unknown.	1 87		Shaller.
9	Coolbaugh.	1	1	D. L. & W.	15	90	Whittaker.
10	Barrett.	1.5	1	Unknown.		25	Whittaker.
11	Barrett.	20	5	D. L. & W.	3 43	5 20	Whittaker.
12	Middle Smithfield.	2		Unknown.		45	Strobeck.

Dec. 22	Barrett,	2	2	D. L. & W.	7 30	10	Whittaker.
27	Middle Smithfield,	25	25	Unknown.		25	Mosler.
6	Barrett,	50	1	D. L. & W.	1 20	18 00	Whittaker.
7	Pocoyo,	4	25	D. L. & W.	10 15	1 20	Learn.
7	Paradise,	75	10	Unknown.		27 00	Strobeck.
		1,128.2	\$1,304	D. L. & W.	\$174 95	\$89 01	
MONTGOMERY COUNTY.							
Nov. 4	Upper Merion,	10		Hunters.			Morris.
11	Springfield,	1		Railroad (?)			Morris.
NORTHAMPTON COUNTY.							
Dec. 8	Upper Mt. Bethel,	11		Incendary.	\$2 80		Cooper.
NORTHUMBERLAND COUNTY.							
April 15	Snydertown,	8	\$20	P. & R.	\$3 75	\$2 25	Wagner.
16	W. Chillisquaque,	50		Campers (a).		28 50	Heddings.
18	Snydertown,	35	200	P. & R.	11 35	9 75	Wagner.
May 12	Snydertown,	24	250	Burning brush (b).		8 00	Wagner.
14	Shamokin,	210	3	Unknown.	26 05		Swank.
Oct. 25	Coat,	3		Unknown.	4 89		Strausser.
Nov. 11	Mount Carmel,	10		Unknown.	35		Smith.
12	Mount Carmel,	2		Unknown.	4 45	3 60	Snyder.
25	Lower Augusta,	5	75	P. R. R.	18 40		Phillips.
Dec. 6	Mount Carmel,	300	10	Unknown.	1 33	1 80	Smith.
6	Upper Augusta,	1	20	P. R. R.	5 35		Snyder.
8	Shamokin,	4		Railroad.	\$79 55	\$53 90	Snyder.
		655.5	\$578				
PERRY COUNTY.							
April 18	Center,	30	\$150	N. & S. V.	\$11 78	\$1 35	Fry.
18	Center,	25	225	Burning brush.	10 23		Fry.
20	Junata,	26	402	Unknown.	13 25	45	Reisinger.
20	Penn.	5	50	Unknown.	3 25	1 20	Niekum.
May 6	Center,	20	40	N. & S. V.	5 95	2 70	Dile.
7	Saville,	3	30	Unknown.	3 85	45	Reisinger.
8	Toboyne,	2		Unknown.	6 00	2 50	Bryner.
20-21	Center,	3		Unknown.	4 90		Fry.
Aug. 23-24	Liverpool,	.5		Lightning.			Grubb.

Note (*)—Settlement demanded from owner but not yet finally adjusted.

Note (a)—Campers helped to extinguish fire and voluntarily paid warden's bill of \$28.50.

Note (b)—Warden's bill of \$6.50 paid by person responsible.

TABLE I—Continued.

Date.	Township.	Acres.	Damage.	Cause.	Cost of Extinction.		Warden.
					Fire Fund.	Other Sources.	
PERRY COUNTY—Continued.							
Nov. 2	Miller.	4	4	Hunters.	5 80		Honck.
4	Toboyne.	5	5	Hunters.	1 29		Bryner.
9	Madison.	50		Unknown.	7 45		Hench.
11	Buffalo.	3	17	Hunters (*)		1 15	Rhoads.
11-12	Penn.	70	300	Unknown.	7 90		Nickum.
11-13	Tuscarora.	50	15	Hunters (?)	55 10		Kremer.
		296	\$1,273		\$136 84	\$9 80	
PIKE COUNTY.							
April 3	Lehman.	4	\$2	Smoker (†).		\$1 00	Mink.
18	Lehman.	20	5	Fisherman.	6 40		Stout.
20	Lehman.	4	2	Fisherman.	1 89		Strobeck.
May 10	Palmira.	100	100	Unknown.	4 45		Stadden.
12	Lackawaxen.	150	300	E. R. R.		15 75	Stadden.
13-14	Millford-Shohola.	200	600	Unknown.	44 55		Drake.
18-19	Westfall.	25		Hunters.	40 93		Drake.
2-3	Westfall.	50		Hunters.	36 92		Drake.
Nov. 7-8	Greene.	3		Hunters.	11 75		Gilpin.
22	Lehman.	75	60	Unknown.	14 38		Stout.
Dec. 7	Porter.	40		Hunters.	1 02		Strobeck.
7-8	Palmira.	500	1,000	Unknown.	24 40		Gumblie.
8	Porter.	1,500	2,000	Hunters.	13 75		Avery.
8	Lackawaxen.	100		Hunters.	10 15		Rosencrance.
7-8	Lackawaxen.	50	100	Unknown.	4 08		Simonson.
8	Westfall.	50	250	Unknown.	3 85		Manwaring.
		2,871	\$4,459		\$218 52	\$30 65	
POTTER COUNTY.							
April 11	Stewardson.	2	\$20	Unknown.	\$2 37	\$1 20	Golden.
11	Stewardson.	10	5	Burning building.	3 25	2 00	Caldwell.
16	Eulalia.	30	15	Burning brush (a).	8 90	3 30	Emerick.
May 2	Abbott.			Fishermen.			Van Horn.
4-7	West Branch.	1,000	2,500	Unknown.	46 45	108 00	Conable.
9-10	Abbott.	5		Unknown.	5 95		Niklaus.

10-11	Sharon.	20	10	Burning brush (b).	2 52	2 55	Scoville.
10-11	Pike.	20	25	Burning brush (c).	3 38	1 05	Page.
10-12	Pike-Ulysses.	10		Unknown.	11 88		Van Horn.
11	Abbott.			Fishermen.			Fox.
11	Keating.	1	2	B. & S.	5 33		Fox.
11	Portage.			Burning brush (d).			Van Horn.
11-12	Abbott.	180	450	Sawmill (e).	73 00	21 00	Van Horn.
11-12	Homer.	400	200	Unknown.	12 25	12 00	Quimby.
11-12	Sweden.	50	50	Burning brush.	19 32	2 00	Snyder.
11-12	Summit.	125	300	Burning brush (f).	21 85	2 88	Baker.
11-13	Ulysses-Pike-West Branch.	10,400	6,400	Burning brush (g).	68 85	14 40	Ayers-Baker.
11-13	Wharton.	50	100	Incendiary (?).	163 63	448 75	Leach.
11-13	Hector.	100	100	Fishermen (?).	16 89		Fox.
11-14	Wright.	100	100	Burning brush (h).	21 65	7 20	Mays.
11-14	Pike-Ulysses.	500	250	B. & S. (?).	47 45		Mays.
12	Pike.	50	50	Unknown.	16 09		Page.
12	Keating.	1		B. & S. A. (i).	3 53	1 20	Fox.
13-14	Eulalia.	65	125	Lightning.	34 55	7 60	Matteson-Moseh.
Sept. 8	East Fork.		1	Hunters.	2 05	80	Golden.
Oct. 18	Stewardson.	100	110	Unknown.	24 55		Kemp-Bunker.
28-30	Oswayo.	25	25	Hunters.	12 25		Mosch.
28-30	Allegheny.	10	1	Burning brush (j).	4 75	2 84	Bratz.
Nov. 2-3	Abbott.	10	1				
		13,385.1	\$10,843		\$645 69	\$643 37	
SCHUYLKILL COUNTY.							
April 12-13	East Norwegian.	10	\$700	Mining engine.	\$17 65		Weiss.
17-18	New Castle.	25	250	Unknown.	55 85		Weiss.
18	Barry-Butler.	50	50	P. & R.	15 40		Naurer.
18-19	Hegins.	350		Sawmill (k).	05 11		Morgan.
19	Blythe.	20	150	P. R. R.	4 10	\$21 00	Weiss.
19	Rain.	500	500	Unknown.	13 05		Neumiller.
20	West Mahanoy.	100	50	Mining engine.	5 15		Hefner.
29	East Norwegian.	20	3,00	Unknown.	13 25		Weiss.
30	East Norwegian.	1		Boys.	7 00		Ellis.
May 2	Ryan.	1		Fishermen.	2 07		Weiss.
5	East Norwegian.	10		Mining engine.	17 45		Weiss.
11	West Brunswick.	200	1,000	Railroad (l).	17 05		Moyer.

Note (*)—Bill outlawed because not presented within sixty day limit.

Note (†)—Referred to Attorney General. Warrant issued for guilty party who immediately left for "parts unknown."

Note (a)—Settlement demanded of person responsible but later withdrawn because fire was on his own land and was extinguished by himself and his own men.

Note (b)—Settlement demanded of person responsible but not yet finally adjusted.

Note (c)—Settlement demanded of person responsible but not yet finally adjusted.

Note (d)—Attorney General refused case. Settlement demanded of person responsible.

Note (e)—Settlement demanded of owner of mill but not yet finally adjusted.

Note (f)—Prosecution ordered by Attorney General. Aged defendant plead guilty. Sentence suspended upon payment of costs of prosecution, \$14.45.

Note (g)—Settlement demanded of person responsible because of insufficient evidence.

Note (h)—Settlement demanded of person responsible but not yet finally adjusted.

Note (i)—Warden's bill of \$34.55 paid by the railroad company.

Note (j)—Settlement demanded of person responsible but not yet adjusted.

Note (k)—Claim presented to owner of mill but not yet settled.

Note (l)—See also fire of same date in Berks Co.

TABLE I—Continued.

Date.	Township.	Acres.	Damage.	Cause.	Cost of Extinction.		Warden.
					Fire Fund.	Other Sources.	
SCHUYLKILL COUNTY—Continued.							
May 12	Ryan.	4	200	Fishermen.	4 61	.....	Ellis.
12	East Brunswick.	10	100	L. V.	2 90	.....	Turner.
13-14	West Brunswick.	800	950	P. & R.	23 70	.....	Koenig.
21	North Manheim.	600	800	Unknown.	23 15	.....	Wharmby.
22	North Union.	3	75	Child (1).	7 59	.....	Heffner.
22	West Mahanoy.	20	90	Unknown.	7 05	.....	Bruno.
22	Kline.	10	.....	Unknown.	4 67	.....	Bruno.
Sept. 30	Kline.	14	.....	Unknown.	4 38	.....	Bruno.
1	East Union.	10	.....	Unknown.	3 55	.....	Pelfer.
29	Washington.	1	.....	Hunters.	.....	.....	15 Kemmerling.
Nov. 2	West Penn.	10	20	L. V.	3 70	.....	Staudt.
3	West Penn.	2 5	25	L. V. (?).	2 46	.....	Staudt.
3	West Penn.	1	.....	Unknown.	3 50	.....	Shoup.
3	Union.	7	.....	Unknown.	6 25	.....	Weiss.
9-10	East Norwegian.	10	50	Unknown.	10 75	.....	Weiss.
11-12	East Norwegian.	20	20	Mining engine.	7 12	.....	Daves.
19	Butler.	20	40	Trespassers.	1 56	.....	Daves.
26	Butler.	6	3	Trespassers.	2 01	.....	Daves.
26	Butler.	1	20	Trespassers.	53	.....	Staudt.
Dec. 6	West Penn.	20	40	L. V. (?).	3 06	.....	Staudt.
6	West Penn.	2	50	P. & R.	3 65	6 00	Conner.
6	Butler.	40	80	L. & N. B. (?).	6 23	.....	Staudt.
7	West Penn.	200	200	Unknown.	18 20	.....	Bruno.
6-7	Kline.	12	25	P. & R.	4 25	.....	Conner.
7	Butler.	2	3	Trespassers.	1 25	.....	Daves.
8	West Mahanoy.	.....	.....	.....	.....	.....	.....
		3,092.7	\$8,491		\$394 31	\$39 30	
SNYDER COUNTY.							
April 16	West Perry.	33	.....	Unknown.	\$42 85	\$2 00	Amig.
29	Adams.	380	500	Incendary.	11 85	6 60	Bartschat.
May 6	West Perry.	100	60	Unknown.	8 80	.....	Strawzer.
11	Franklin.	4	40	Sawmill (2).	11 36	3 75	Reigle.
Aug. 8	Adams.	550	.....	Ree hunters.	3 05	2 00	Bartschat.
11-13	West Beaver.	3	5	Smoker (3).	57 20	.....	Marks.
Oct. 9	West Beaver.	15	.....	P. R. R.	1 45	.....	Marks.
Nov. 26	Adams.	1,200	850	Hunters.	101 66	3 60	Bartschat.
Dec. 6-8	Adams-Centre.	2,205.2	\$1,455	Incendary (4).	\$278 22	42 00	Bartschat.
						\$59 95	

SOMERSET COUNTY.

April 20-21	Shade.	100	\$500	Lumbering (a).	\$4 75		Wechtenhiser.
May 1-2	Summit.	60	25	Lumbering (b).	2 75	\$12 75	Engle.
16	Elk Lick.	2	3	Lumbering (b).	1 38		Engle.
16	Elk Lick.	3	3	Lumbering (b).	2 73		Engle.
June 16	Northampton.	30	1	Unknown.	2 95	30	Brick.
Oct. 1	Jefferson.	50	50	Burning brush (c).	2 30		Becker.
27	Fairhope.	75	75	Unknown.	7 32		Baron.
28-29	Middlecreek.	3	10	Unknown.	9 98		Baron.
30	Stonycreek.	400	200	Unknown.	2 45		Baron.
Nov. 2-3	Ogle.	200	200	Unknown.	31 98		Whitaker.
2-3	Addison.	40	105	Unknown.	16 15		Baker.
2-3	Jenner.	30	50	Hunters.	7 33		Emrick.
3	Fairhope.	40	400	Unknown.	6 08		Barron.
3-4	Middlecreek.	200	200	Unknown.	7 88		Beachy.
8-9	Northampton.	300	1,500	Hunter.	18 35		Barron.
12	Middlecreek.	15	25	Unknown.	11 65	1 20	Holsopple.
13	Faint.	60	95	Railroad (?).	7 95		Brick.
16-17	Northampton.	35	100	Unknown.	12 00		Baker.
18-19	Lincoln.	100	100	Hunters.	6 02		Troutman.
19	Southampton.	20	32	Burning house.	4 32		Merrill.
21	Addison.	6	25	B. & O. (?).	2 65	30	Brant.
21	Shade.	30	600	Child (d).	17 10	90	Manges.
Dec. 7	Conemaugh.	500	300	Incendary.		7 00	Benson.
Oct. 22-23	Elk Lick.	1,940	\$4,533	Incendary.	\$197 58	\$22 45	Stevanus.
SULLIVAN COUNTY.							
April 12	Cherry.	5		Campers.			D. Morter.
13	Cherry.	20	\$90	W. & N. B.	\$7 75		D. Morter.
19	Cherry.	10	20	L. V. (?).	2 35		McGee.
19	Cherry.	80		Unknown.	5 05		McGee.
19-20	Cherry.	21	6	L. V.			C. Morter.
21	Cherry.	3		Unknown.	3 70		McGee.
21	Cherry.	4		Incendary.	2 95		D. Morter.
30	Cherry.			Unknown (e).	27 55		Gorman.
May 9-13	Davidson.	20	130	L. V. & N. B.	3 85		D. Morter.
11-12	Cherry.	30		L. V.	58 66		Gorman.
11-12	Laporte.	3		L. V.	2 65		C. Morter.
12	Cherry.						

Note (1)—Excused because of extreme poverty of guardian.

Note (2)—Settlement demanded of persons responsible but not yet finally adjusted.

Note (3)—See also fire of same date in Juniata county.

Note (4)—See also fire of same date in Union county.

Note (5)—Settlement demanded of persons responsible but not yet finally adjusted.

Note (6)—Evidence insufficient for a prosecution but responsible company warned.

Note (7)—Warden's bill of \$2.20 paid by person responsible.

Note (8)—Warden's bill of \$2.65 paid by parent of child Jan. 3, 1917.

Note (9)—See also fire of same date in Lycoming and Columbia counties.

TABLE I—Continued.

Date.	Township.	Acres.	Damage.	Cause.	Cost of Extinction.		Warden.
					Fire Fund.	Other Sources.	
SULLIVAN COUNTY—Continued.							
May 12-13	Forks,	100	.....	Fishermen,	13 45	\$19 80	Kester.
13-14	Davidson,	6	.....	W. & N. B.,	4 75	.....	Gorman.
13-14	Cherry,	48	25	W. & N. B.,	11 80	1 65	D. Morter.
13-14	Eaglesmere,	5	.....	S. & E.,	1 75	.....	Aumiller.
Sept. 10-15	Shrewsbury,	20	.....	W. & N. B.,	16 75	.....	Aumiller.
Oct. 19	Colley,	2	.....	Hunters (?),	5 80	.....	Kille.
Nov. 6	Cherry,	4	.....	Incendiary,	1 15	.....	D. Morter.
Nov. 6	Cherry,	4	.....	Unknown, .....	.....	.....	O. Morter.
Dec. 6-7	Cherry,	6	15	L. V.,	3 55	.....	C. Morter.
Dec. 6-7	Cherry,	50	10	L. V.,	1 92	7 50	C. Morter.
Dec. 6-7	Cherry,	100	.....	L. V.,	4 93	6 40	C. Morter.
		542	\$286		\$180 36	\$35 35	
SUSQUEHANNA COUNTY.							
Dec. 7	Bridgewater,	25	.....	L. V.,	\$2 95	.....	Payne.
TIOGA COUNTY.							
April 7	Elk,	10	\$10	Lumbering (a), .....	.....	\$2 30	Harbeson.
19-19	Shippen,	40	.....	Unknown,	\$10 60	4 60	Peters.
May 1-3	Shippen,	1,100	.....	Burning brush (b),	21 73	13 30	Peters.
3-4	Morris,	2	2	E. R. R. (c),	1 92	1 10	Keller.
9-10	Morris,	1	1	Lightning,	3 13	.....	Keller.
11-12	Lawrence,	30	20	Unknown,	26 88	.....	Brown.
11-13	Shippen,	90	150	Incendiary,	22 03	2 15	Payne.
11-13	Shippen,	101	25	N. Y. O. (d),	8 37	5 10	Peters.
12-13	Gaines,	50	.....	Burning brush (e), .....	.....	11 35	Smith.
Aug. 18-24	Hamilton,	110	100	Unknown,	47 20	.....	Higland.
19-23	Shippen,	8	75	Burning brush (f),	14 95	.....	Payne.
Sept. 4	Delmar,	5	20	Unknown,	6 55	.....	Torry.
Nov. 16	Morris,	1	.....	Railroad (?), .....	.....	18	Campbell.
Dec. 8-9	Pine,	1,000	500	Hunters,	40 25	6 80	Harbeson.
		2,547.1	\$903		\$203 61	\$46 83	

UNION COUNTY.							
April 19-20	Lewis,	300	\$300	Unknown.	\$68 40	\$13 68	Metzger.
May 6-7	Hartley,	5	600	P. R. R.,	33 65	15	Meek.
May 10	West Buffalo,	1	5	Lumbering (?),	2 55	9 12	Metzger.
10-11	Hartley,	85	100	Lightning,	30 87	2 40	Silvius.
Oct. 25-26	Lewis,	10	100	Smoker,	5 95	13 80	Winter.
Nov. 18	Buffalo,	1	2	Hunter,	4 49		Deno.
Nov. 23-24	Hartley,	5	150	P. R. R.,	10 90		Meek.
Dec. 6-8	Limestone,	200	150	Hunters,	17 00		Bronse.
	Hartley-Lewis,	902.5	\$1,408	Incendiary (1),	\$173 81	\$39 15	Bartschat.
VENANGO COUNTY.							
May 2-4	President,	250	\$1,500	Unknown,			Wirt.
Oct. 29	Cherrytree,	1		P. R. R.,		\$6 00	Parker.
Nov. 7-9	Canal,	55	248	E. R. R.,		\$6 00	Mahaffey.
		306	\$1,745				
WARREN COUNTY.							
Aug. 2-3	Southwest,	30		Clearing (2),	\$34 50	\$24 00	Allison.
14	Glade,	1.5		Berry pickers,	2 95		Winchester.
14	Southwest,	78	300	N. Y. C.,	4 00		Strite.
17	Southwest,	5		Unknown,			Gustafson.
17-28	Southwest,	10		N. Y. C. (3),	7 83	4 80	Gustafson.
17-18	Blured,	10		N. Y. C. (3),	1 62	2 10	Johnson.
Nov. 8	Pittsfield,	20		Burning brush (4),	6 63		
		154.5	\$310		\$57 63	\$30 90	
WAYNE COUNTY.							
April 16	Waymart,	25	\$25	Railroad (5),		\$12 00	Denk.
May 5	Canaan,	50	50	Railroad (?),	\$16 18		Shorts.
May 11-12	Canaan,	100	100	Railroad (?),	9 22		Shorts.
12-13	Palmyra,	50	1,000	Hunters (6),	14 65		Schlosser.
Oct. 23-29	Lebanon,	25			12 60		Gafer.

Note (a)—Company responsible paid claim of \$10 for damages to State Forest.
 Note (b)—Case refused by Attorney General. Person responsible has promised to pay bill.
 Note (c)—Claim for damages and cost of extinction not yet settled.
 Note (d)—Case refused by Attorney General.
 Note (e)—Warden's bill of \$11.35 paid by person responsible but not yet settled.
 Note (f)—Settlement demanded from person responsible but not yet settled.
 Note (g)—See also first of same date in Snyder county.
 Note (h)—Warden's bill of \$30.50 paid by drillers responsible.
 Note (i)—Warden's bills presented to the railroad company at their request and paid by them.
 Note (j)—Warden's bill paid by person responsible.
 Note (k)—Bill outlawed because not presented within the sixty day limit.
 Note (l)—Settlement demanded of person responsible but not yet finally adjusted.

TABLE I—Continued.

Date.	Township.	Acres.	Damage.	Cause.	Cost of Extinction.		Warden.
					Fire Fund.	Other Sources.	
WAYNE COUNTY—Continued.							
Nov. 3	Dreher,	1.5	10	Hunters,	1 62	1 35	Jones,
Nov. 3	Dreher,	.7	.....	Hunters,	4 75	.....	Dunning,
Nov. 8-9	South Canaan,	2	.....	Unknown,	4 93	.....	Robinson,
Nov. 9	Dreher,	1	.....	Unknown,	52 30	.....	Dunning,
Dec. 6-7	Pumpack,	700	1,400	Hunters, .....	.....	.....	Daniels,
		955.2	\$2,585		\$115 65	\$13 55	
WESTMORELAND COUNTY.							
April 16	Ligonier,	25	\$15	P. W. & S.,	\$4 30	\$1 35	Bearer,
April 20	Unity,	25	250	Sawmill (a),	8 01	.....	Johnston,
May 1-3	Fairfield,	310	355	Lumbering (b),	22 60	.....	Frain,
May 11	Ligonier,	125	253	Incendiary (c),	17 87	.....	Darr,
May 12	Unity,	50	150	Hunters,	3 10	.....	Johnston,
May 12	Donnegal,	1	3	Unknown,	1 45	6 00	Knupp,
May 12-14	Ligonier,	165	333	Incendiary (c),	42 64	3 55	Darr,
May 13	Ligonier,	10	20	Incendiary (c), .....	.....	.....	Darr,
May 13	Ligonier,	5	.....	Lumbering (d), .....	.....	.....	Darr,
Oct. 27-28	Cook,	20	150	Hunters,	5 78	6 00	Darr,
Oct. 28	Derry,	50	100	Unknown,	8 50	1 50	Campbell,
Oct. 28-29	Ligonier,	3	50	Hunters,	9 70	.....	Johnson-Schwalm,
Oct. 28-29	Ligonier,	400	100	Hunters,	7 80	.....	Wolford,
Oct. 29	Derry,	2	.....	P. R. R.,	32 68	.....	Will,
Oct. 29	St. Clair,	5	25	Unknown,	9 40	.....	Schwalm,
Oct. 29	Penn.,	4	.....	Unknown,	4 15	.....	Reed,
Oct. 29-30	Fairfield,	5	25	Unknown,	13 75	.....	Penman,
Oct. 30	Ligonier,	3	15	Previous fire,	21 75	.....	Frain,
Oct. 30-31	Ligonier,	2	.....	Hunters,	13 17	.....	Darr,
Nov. 2	Fairfield,	2	.....	Hunters,	3 57	.....	Will,
Nov. 3-4	Ligonier,	225	300	Incendiary,	29 03	.....	Reed,
Nov. 9	Fairfield-Derry,	640	150	Unknown,	30 05	.....	Wolford,
Nov. 12	Fairfield,	60	50	Unknown,	8 20	.....	Frain-Reed,
Dec. 6-7	Penn.,	1	2	Unknown,	4 15	.....	Frain,
Dec. 8	Cook,	20	15	Burning brush (e),	14 50	2 40	Bearer,
Dec. 8	Derry,	4	.....	Unknown,	7 00	3 00	Knupp,
		2,163.5	\$2,361		\$324 00	\$23 80	Schwalm,

WYOMING COUNTY.

April 19-21 Noxen,

Nov. 27 Meshoppen,

Dec. 6-7 Meshoppen,

Dec. 6-7 Falls,

Dec. 6-7 Washington,

Dec. 6-7 Forkston,

Dec. 7 Noxen,

Dec. 7-8 McKeon,

Dec. 8-9 Braintown,

L. V.,

Unknown,

L. V.,

L. V.,

L. V.,

Unknown,

Unknown,

Unknown,

L. V.,

\$19 30

13 35

13 30

11 05

15 85

5 65

8 35

9 70

Schenck,

Craig,

McKane,

Carney,

Lewis,

Turner,

Decker,

Hoadley,

\$0 60

13 63

8 40

.....

.....

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\$102 15

\$22 65

Brooks,

Hoover,

Sinclair,

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.....

.....

\$12 35

9 30

\$21 68

YORK COUNTY.

April 18 Fawn,

April 18-19 Hellam,

May 4 Lower Chanceford,

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Note (a)—Referred to Attorney General, Case pending.

Note (b)—Settlement demanded of persons responsible but not yet finally adjusted.

Note (c)—Referred to Attorney General, Investigation authorized.

Note (d)—Settlement demanded of persons responsible but not yet finally adjusted.

Note (e)—Warden's bill paid by person responsible.

TABLE II. Summary by Counties of the Cause, Area, Damage, and Cost of Extinction of Forest Fires in 1916.

County.	Causes.								Total.	Area.	Total damage.	Cost of Extinction.	
	Railroads.	Brush burning.	Incendiary.	Campers.	Lumbering.	Lightning.	Miscellaneous.	Unknown.				From fire fund.	To individuals.
Adams.	.....	.....	7	1	.....	.....	1	.....	9	526	\$1,606	\$107 65	\$43 38
Allegheny.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Armstrong.	6	.....	.....	2	.....	.....	.....	2	10	222	917	38 10	24 85
Beaver.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bedford.	3	.....	.....	.....	.....	.....	.....	.....	46	4,996	4,703	483 16	79 72
Berks.	10	1	1	9	3	.....	1	23	13	2,225	5,112	305 71	4 08
Blair.	5	4	1	7	6	.....	3	15	41	17,977	19,743	636 69	102 85
Bradford.	2	.....	.....	.....	.....	.....	.....	.....	1	47	32	17 00	2 75
Bucks.	1	.....	.....	.....	.....	.....	.....	.....	4	35	74	20 05	.....
Butler.	1	.....	.....	.....	.....	.....	.....	.....	2	60	.....	9 85	.....
Cambria.	13	2	.....	7	1	.....	.....	.....	1	614	2,233	139 75	30 15
Cameron.	5	2	1	.....	1	.....	.....	7	15	8,207	7,445	196 55	236 62
Carbon.	15	2	2	3	.....	.....	11	33	43	7,466	10,429	376 73	21 90
Centre.	14	2	.....	.....	.....	.....	12	9	47	9,143	8,161	1,556 20	891 15
Chester.	.....	.....	.....	2	.....	.....	.....	3	5	454	4,657	.....	.....
Clarion.	.....	.....	.....	.....	.....	.....	.....	2	2	7	26	13 35	90
Clearfield.	3	1	.....	4	.....	.....	1	1	14	3,482	1,071	177 95	10 90
Columbia.	23	.....	4	.....	.....	.....	6	14	56	6,701	23,330	529 40	538 15
Clinton.	.....	.....	.....	1	.....	.....	2	4	8	3,248	17,725	187 88	17 20
Crawford.	.....	1	.....	.....	.....	.....	.....	.....	2	752	.....	4 75	90
Cumberland.	2	.....	.....	8	.....	.....	.....	2	20	1,517	2,019	180 01	54 85
Dauphin.	10	.....	.....	3	.....	.....	.....	5	20	3,604	6,466	307 94	91 80
Delaware.	11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Erie.	6	1	.....	6	1	.....	.....	.....	14	1,380	2,792	581 56	29 75
Forest.	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Franklin.	6	4	6	5	1	.....	.....	8	26	3,508	7,247	316 10	19 55
Fulton.	.....	1	41	10	1	.....	.....	15	9	327	2,219	23 30	7 85
.....	.....	.....	.....	4	.....	.....	.....	.....	15	1,526	2,362	541 90	385 95
.....	.....	.....	3	.....	.....	.....	.....	.....	15	1,200	.....	276 05	36 71

Greene.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Huntingdon.	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Indiana.	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Jefferson.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Junata.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lackawanna.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lawrence.	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lebanon.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lehigh.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Luzerne.	14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lycoming.	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
McKean.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mercer.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mifflin.	22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Monroe.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Montgomery.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Montour.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Northampton.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Northumberland.	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Perry.	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Philadelphia.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pike.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Potter.	13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Schuylkill.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Snyder.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Somerset.	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sullivan.	14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Susquehanna.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tioga.	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Union.	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Venango.	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Warren.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wayne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Westmoreland.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wyoming.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
York.	1										
Total.	270	55	95	182	44	10	45	312	1,013	\$276,292	\$4,661 11

County.

Lancaster,																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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TABLE IV. *Classification of Fires By Acreage.*

County.	Less than 1 acre.		1 to 100 acres.		100 to 1000 acres.		More than 1,000 acres.		Total	
	Number.	Area.	Number.	Area.	Number.	Area.	Number.	Area.	Number.	Area.
Adams,	2	1	6	212	1	313	.....	.....	9	526
Allegheny, .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Armstrong,	1	.2	9	222	.....	.....	.....	.....	10	222.2
Beaver, .....	.....	.....	30	896	16	4,100	.....	.....	46	4,996
Bedford, .....	.....	.....	20	225	4	2,000	.....	.....	27	2,225.4
Berks,	3	.4	24	677	13	4,300	3	13,000	41	17,977
Blair,	1	?	3	47	.....	.....	.....	.....	3	47
Bradford, .....	.....	.....	4	35	.....	.....	.....	.....	4	35
Bucks, .....	.....	.....	1	60	.....	.....	.....	.....	1	60
Butler, .....	.....	.....	23	213	2	400	.....	.....	31	614.2
Cambria,	6	1.2	9	272	3	935	1	7,000	15	8,207
Cameron,	2	?	21	448	7	2,017	2	5,000	33	7,465.9
Carbon,	3	.9	29	821	15	3,372	2	4,950	47	9,143.2
Centre,	1	.2	4	54	1	400	.....	.....	5	454
Chester, .....	.....	.....	2	7	.....	.....	.....	.....	2	7
Clarion, .....	.....	.....	10	181	1	300	1	3,000	14	3,481.8
Clearfield,	2	.8	33	935	18	4,765	1	1,000	56	6,700.8
Clinton,	4	.8	5	48	1	100	2	3,100	8	3,248
Columbia, .....	.....	.....	1	2	1	750	.....	.....	2	752
Crawford, .....	.....	.....	13	259	3	1,257	.....	.....	20	1,517
Cumberland,	4	1	8	234	12	3,370	.....	.....	20	3,604
Dauphin, .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Delaware, .....	.....	.....	8	79	3	1,300	.....	.....	14	1,380.1
Elk,	3	1.1	.....	.....	.....	.....	.....	.....	.....	.....
Erie, .....	.....	.....	14	453	11	3,454	.....	.....	26	3,907.5
Fayette,	1	.5	6	97	1	240	.....	.....	8	337
Forest,	1	?	56	725	5	800	.....	.....	75	1,525.7
Franklin,	14	.7	13	150	4	1,050	.....	.....	18	1,200
Fulton,	1	?	.....	.....	.....	.....	.....	.....	.....	.....
Greene, .....	.....	.....	24	559	4	650	2	6,370	34	7,610.3
Huntingdon,	4	1.3	4	67	1	390	.....	.....	5	457
Indiana, .....	.....	.....	2	16	.....	.....	.....	.....	2	16
Jefferson, .....	.....	.....	9	167	3	650	2	2,875	16	3,692.2
Juniata,	2	.2	5	340	7	2,710	.....	.....	12	3,050
Lackawanna, .....	.....	.....	1	50	1	300	.....	.....	2	350
Lancaster, .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lawrence, .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lebanon, .....	.....	.....	6	188	2	1,100	.....	.....	2	1,100
Lehigh, .....	.....	.....	32	673	12	2,785	3	12,400	49	15,859
Luzerne,	2	1	15	174	6	1,714	2	3,120	27	5,008.9
Lycoming,	4	.9	4	75	2	550	.....	.....	6	625
McKean, .....	.....	.....	1	6	.....	.....	.....	.....	1	6
Mercer,	6	1	8	146	3	450	1	1,875	18	2,472
Mifflin,	12	4.2	26	449	4	675	.....	.....	42	1,128.2
Monroe, .....	.....	.....	2	11	.....	.....	.....	.....	2	11
Montgomery, .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Montour, .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Northampton,	1	.4	.....	.....	.....	.....	.....	.....	1	.4
Northumberland,	1	.5	10	145	2	510	.....	.....	13	655.5
Perry,	3	1	12	289	.....	.....	.....	.....	15	290
Philadelphia, .....	.....	.....	10	321	5	1,050	1	1,500	16	2,871
Pike, .....	.....	.....	16	429	7	1,555	2	11,400	30	13,385.1
Potter,	5	1.1	29	342	7	2,759	.....	.....	37	3,082.2
Schuylkill,	1	.2	4	55	3	950	1	1,200	9	2,205.2
Snyder,	1	.2	16	539	6	1,400	.....	.....	25	1,940
Somerset,	3	1	18	341	2	200	.....	.....	23	542
Sullivan, .....	.....	.....	1	25	.....	.....	.....	.....	1	25
Susquehanna,	1	.1	9	236	2	211	2	2,100	14	2,547.1
Tioga,	1	.5	5	102	3	800	.....	.....	9	902.5
Union, .....	.....	.....	2	56	1	250	.....	.....	3	306
Venango, .....	.....	.....	7	155	.....	.....	.....	.....	7	155
Warren, .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington, .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wayne,	1	.7	7	154	2	800	.....	.....	10	954.7
Westmoreland,	3	.5	18	503	6	1,665	.....	.....	27	2,168.5
Wyoming, .....	.....	.....	5	227	4	475	.....	.....	9	702
York, .....	.....	.....	2	47	1	500	.....	.....	3	547
Total,	103	24.6	662	14,269	290	60,568	28	79,890	1,013	154,751.6

TABLE V. *Summary of 1916 Fires By Causes. (Approximated).*

Cause.	Number of Fires.	Area Burned.	Damage.	Cost of Extinction.
Railroads,	270	27,840	\$44,300	\$1,820
Brush burning,	55	8,400	11,235	890
Incendiary,	95	40,200	51,200	1,650
Campers,	182	21,000	28,350	3,410
Lumbering,	44	7,400	8,600	610
Lightning,	10	10	15	40
Miscellaneous,	45	3,300	7,700	380
Unknown,	312	46,600	84,900	5,100
Total,	1,013	154,750	\$236,300	\$13,900

TABLE VI. *Forest Fire Patrol Service During 1916.*

	Number of Men.						Salaries Paid.	
	April.	May.	September.	October.	November.	December.	Associations.	State.
Cambria, .....	.....	.....	.....	.....	1	.....	.....	\$25 00
Centre,	1	2	2	4	6	.....	\$56 38	126 37
Clinton, .....	.....	.....	2	2	2	.....	.....	125 00
Huntingdon, .....	.....	.....	.....	.....	3	3	.....	243 87
Juniata, .....	.....	.....	.....	.....	1	1	.....	44 04
Lycoming, .....	.....	.....	1	1	1	1	.....	158 22
Mifflin, .....	.....	.....	1	1	1	1	.....	120 00
Monroe,	6	6	4	5	7	.....	545 01	544 99
Potter, .....	.....	.....	1	1	1	.....	.....	120 00
Tioga, .....	.....	.....	.....	2	2	.....	.....	86 48
Westmoreland, .....	.....	.....	.....	.....	1	.....	.....	15 75
Total,	7	8	11	18	26	6	\$601 39	\$1,609 72

TABLE VII. *Comparison By Number, Area, Damage, and Cost of Extinction—1915 and 1916 Forest Fires.*

County.	Number.		Area.		Damage.		Cost of Extinction.	
	1915.	1916.	1915.	1916.	1915.	1916.	1915.	1916.
Adams,	4	9	1,540	526	\$5,985	\$1,606	\$76 22	\$107 65
Allegheny, .....	.....	10	877	222	2,350	917	82 50	38 10
Armstrong, .....	.....	.....	.....	.....	.....	.....	.....	.....
Beaver,	39	46	6,449	4,996	11,049	4,703	969 49	483 16
Bedford,	18	27	3,255	2,225	24,850	5,112	497 81	305 71
Berks,	41	3,353	17,977	6,688	19,743	317 82	636 69	.....
Blair,	18	3	958	47	2,227	32	64 10	17 00
Bradford,	7	3	.....	35	650	74	5 75	20 05
Bucks,	2	4	65	60	.....	.....	.....	9 85
Butler, .....	.....	1	.....	.....	.....	.....	.....	.....
Cambria,	17	31	2,253	614	2,313	3,233	351 83	139 75
Cameron,	21	15	4,169	8,207	6,265	7,445	327 87	196 55
Carbon,	33	33	6,686	7,466	42,007	10,429	628 03	376 73
Centre,	85	47	28,120	9,143	52,527	8,161	2,288 90	1,556 20
Chester,	2	5	8	454	153	4,687	43 43	54 02
Clarion,	9	2	727	7	774	26	279 90	13 35
Clearfield,	57	14	14,707	3,482	19,724	1,071	1,477 65	177 95
Clinton,	59	56	70,064	6,701	93,047	23,330	2,247 62	529 40
Columbia,	8	8	3,433	3,248	12,885	17,725	248 55	187 89
Crawford, .....	.....	2	.....	752	.....	.....	.....	4 75

TABLE VII—Continued.

County.	Number.		Area.		Damage.		Cost of Extinction.	
	1915.	1916.	1915.	1916.	1915.	1916.	1915.	1916.
Cumberland,	23	20	19,046	1,517	117,575	2,019	811 46	180 01
Dauphin,	57	20	13,516	3,604	25,045	6,466	1,127 28	307 94
Delaware,	14	14	4,223	1,380	6,055	2,792	872 46	581 56
Elk,	17	26	2,334	3,908	3,423	7,247	207 06	316 10
Erie,	1	8	2,266	337	.....	25	77 65	23 30
Fayette,	65	75	6,257	1,526	7,875	2,219	1,045 13	541 90
Forest,	8	18	4,682	1,200	6,466	2,362	312 88	276 05
Franklin, .....	.....	.....	.....	.....	.....	.....	.....	.....
Fulton, .....	.....	.....	.....	.....	.....	.....	.....	.....
Greene,	35	34	10,767	7,610	36,083	10,113	812 15	963 41
Huntingdon,	1	5	136	457	304	3,400	29 95	81 70
Indiana,	19	2	941	16	3,514	.....	211 90	6 88
Jefferson,	6	16	403	3,692	690	6,061	120 51	206 76
Juniata,	16	12	1,218	3,050	1,263	3,410	139 20	233 68
Lackawanna,	6	2	2,257	350	7,010	2,525	193 68	63 81
Lancaster,	2	.....	10	.....	207	.....	13 05	.....
Lawrence,	9	2	6,559	1,100	8,819	1,200	548 45	55 35
Lebanon,	12	8	5,853	443	35,567	1,560	343 47	75 41
Lehigh,	54	49	7,437	15,859	16,327	15,172	1,006 10	1,020 67
Luzerne,	36	27	9,007	5,009	6,806	10,520	1,104 13	439 16
Lycoming,	5	6	20	625	50	406	14 75	58 41
McKean, .....	.....	1	.....	6	.....	.....	.....	.....
Mercer,	17	18	4,105	2,472	8,538	4,294	968 85	356 61
Mifflin,	40	42	12,505	1,128	18,171	1,394	1,283 10	174 95
Monroe, .....	.....	2	.....	11	.....	.....	.....	.....
Montgomery,	1	.....	12	.....	210	.....	9 70	.....
Montour,	8	1	1,093	.....	2,735	.....	180 28	2 80
Northampton,	9	13	4,618	676	12,265	578	244 20	79 55
Northumberland,	29	15	4,874	290	6,461	1,238	951 40	136 84
Perry, .....	.....	.....	.....	.....	.....	.....	.....	.....
Philadelphia,	31	16	23,049	2,871	30,038	4,453	928 86	218 52
Pike,	28	30	4,845	13,385	15,053	10,843	524 25	645 69
Potter,	27	37	14,379	3,092	131,223	8,491	992 25	394 31
Schuylkill,	5	9	3,905	2,205	16,125	1,455	751 10	238 22
Snyder,	20	25	2,484	1,940	10,987	4,533	200 04	197 53
Somerset,	8	23	301	542	.....	286	69 90	180 36
Sullivan,	4	1	50	25	3,170	.....	44 65	2 95
Susquehanna,	15	14	3,210	2,547	9,455	903	128 04	203 61
Tioga,	11	9	937	902	1,843	1,408	143 82	173 81
Union,	2	3	225	206	850	1,745	23 50	.....
Venango,	3	7	1,095	155	1,030	310	126 75	57 63
Warren, .....	.....	.....	.....	.....	.....	.....	.....	.....
Washington,	12	10	2,570	955	7,175	2,585	597 45	115 65
Wayne,	25	27	4,128	2,169	2,350	2,361	421 91	324 00
Westmoreland,	14	9	4,468	702	4,933	1,381	499 25	102 15
Wyoming,	13	3	206	547	1,582	2,232	89 55	21 63
York, .....	.....	.....	.....	.....	.....	.....	.....	.....
Total,	1,101	1,013	336,635	154,752	\$850,777	\$236,292	\$23,078 16	\$13,913 80

TABLE VIII. Comparison By Months—1915 and 1916 Forest Fires.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
1915, .....	.....	3	84	739	94	18	1	.....	.....	34	119	9	1,101
1916,	4	.....	2	181	307	5	2	23	20	127	220	115	1,013

TABLE IX. Comparison By Acreage—1915 and 1916 Forest Fires.

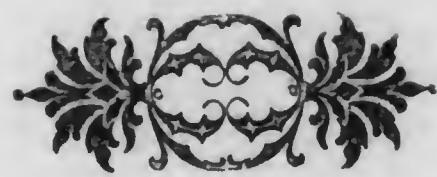
Year.	Less than 1 acre.		1 to 100 acres.		100 to 1,000 acres.		More than 1,000 acres.		Total.	
	Number.	Acres.	Number.	Acres.	Number.	Acres.	Number.	Acres.	Number.	Acres.
1915,	61	31	639	20,637	323	115,116	78	200,851	1,101	336,635
1916,	103	25	662	14,260	220	60,568	28	79,890	1,013	154,752

TABLE X. Comparison By Causes—1915 and 1916 Forest Fires.

Year.	Railroads.	Brush burning.	Incendary.	Campers.	Lumbering.	Lightning.	Miscellaneous.	Unknown.	Total.
1915,	274	105	120	136	28	19	37	382	1,101
1916,	270	55	95	182	44	10	45	312	1,013

TABLE XI. STATE FOREST LAND BURNED—1915 and 1916.

County.	Total State land June 1, 1916.	Area Burned.	
		1915.	1916.
Adams,	20,886	1,540	134
Bedford,	10,018	125	100
Cameron,	81,194	1,410	6,085
Centre,	78,445	2,408	5,134.2
Clearfield,	47,506	25	3.2
Clinton,	129,090	13,275	472.5
Cumberland,	20,450	5,550	892.5
Dauphin,	3,354	2,000	.....
Elk,	14,840	135	100
Franklin,	33,910	502	604.6
Fulton,	6,300	.....	.....
Huntingdon,	57,285	17	5,473.3
Juniata,	3,178	.....	327.7
Lackawanna,	4,956	.....	800
Lycoming,	88,927	2,704	1,780.1
Mifflin,	49,526	137	1,597.1
Monroe,	6,401	.....	.....
Perry,	26,471	2,150	.....
Pike,	57,254	6,155	394
Potter,	129,607	365	180.8
Snyder,	19,086	2,825	1,615
Somerset,	3,467	78	.....
Tioga,	57,406	105	1,178
Union,	53,675	387	786
Westmoreland,	5,065	70	
Wyoming,	1,177		
Total,	1,009,474	41,963	27,718



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